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Improved Cut-off in Engines.

Most of the features of modern steam engineering originated in the fertile brain of James Watt. He found the steam engine in a very crude state and left it in quite as perfect a condition (excepting only mechanical construction) as that of the ordinary engines at the present time. He invented separate condensation, expansion, steam jacketing, superheating, and the governor. The combination of the governor with a cut-off valve gear was reserved to a later period, having first been published in the "Repertory of Patent Inventions" for 1826, as the invention of James Whitelaw. Since then the steam engine has advanced by improvement in details and construction rather than by the development of new principles.

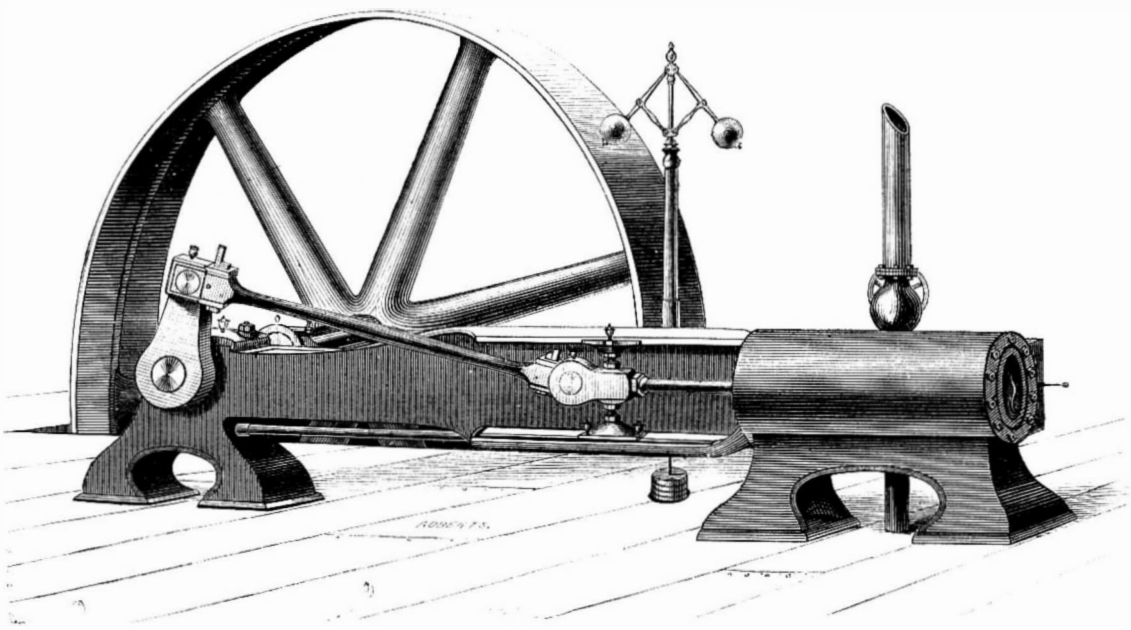
The inventors of the engine herewith presented to the public make no pretension to the introduction of radical improvements in the principle of using steam expansively, but they have devised and perfected a new and simple method of operating and controlling the action of the valves for admitting and cutting off the steam, by means of which better results are obtained than by the devices heretofore in use.

There is no necessity at the present day to argue the superiority of an engine regulated by the cut-off to one regulated by the throttle, so far as economy of fuel or regularity of speed are concerned. Practical business men have settled that question for themselves by experience, and no shrewd business man will purchase a throttle valve engine when he can procure one which automatically adjusts the supply of steam to the exact amount required for the work in hand. There are occasional situations, where the load is constant and the engine and pressure of steam are exactly adapted to the circumstances, when a fixed cut-off will give nearly or quite as good results as an automatic cut-off, but a change in the load or pressure of steam will disturb the conditions so as to destroy the equality. With a perfect auto. matic valve gear and regulator the variation of load or pressure within reasonable limits will not materially affect the economy; while there is no other possible means of regulating the speed and power of an engine with the perfection which is attained by a governor attached directly to a sensitive cut-off valve gear.

This engine has a novel construction of the governor, by which the variation due to the pendulum action of the ordinary governor is overcome, and a regulator produced which will give the same speed whether the engine be light or heavily loaded, or the pressure of steam in the boiler be greater or less. The governor as invented by Watt, and adopted by modern engineers with rare exceptions, gives only an approximation to equal speed, requiring a variation of from five to thirty per cent between the extremes of motion.

In designing this engine it has been the object of the inventors not only to introduce their own peculiar ideas and improvements, but to combine therewith all those features which long practice has proved to be most conducive to economy of fuel, and the durability of all the working parts. The steam jacket has been much neglected in this country, though in almost universal use by the best engine makers of Europe; and so little is its theory and advantages understood here, that in most cases where it has been introduced in this country it is filled with the exhaust steam, thus defeating the very object for which it was designed. This engine is jacketed with live steam from the boiler in both heads as well as around the cylinders, thereby keeping the metal of the cylinders, as hot as the hottest steam which enters it.

The valves which effect the distribution of the steam in the steam engine are the most important part of the machine, as upon their properly performing their functions depends the efficiency of the working mediums. They must not only admit, exhaust, shut off, and close, at the proper periods, but they must be perfectly tight when closed, and when open admit the steam with the least possible resistance. They should also permit of such a relation to the cylinder as to give the least practicable lost space or clearance. There are four distinct varieties of valves used for this purpose, viz.: the plug or cock, the piston, the seat valve or poppet, and the slide. The first variety is never used now by competent engineers, having but one good quality, viz.: the equal pressure of steam on its sides, to balance its many bad features, such as leakages, sticking from expansion, and unequal wear. The piston valve is also nearly out of use owing to the excessive lost space inherent in its construction. The same objection applies to the poppet valve with the additional ones of great liability to leakage, and inability to open and close quickly from the fact that it opens immediately on starting, and is not closed until brought to rest. It is impossible to start or stop the valve instantaneously, therefore the opening and closing must be correspondingly so slow as to be objectionable except on slowly moving engines.



THE BABCOCK & WILCOX STEAM ENGINE.

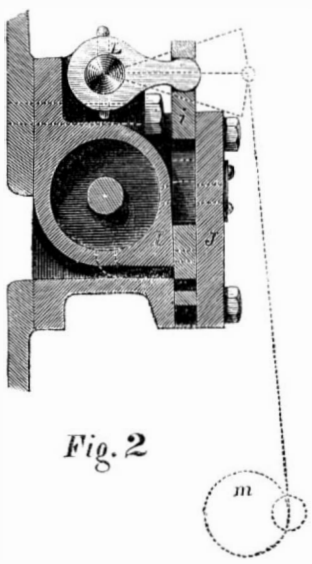
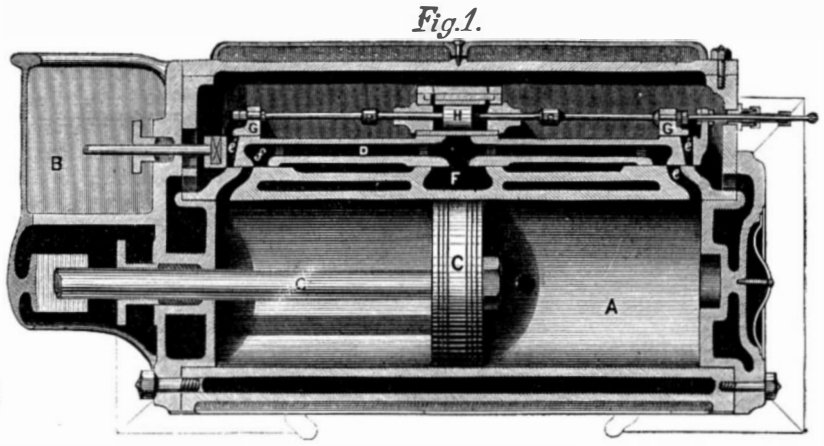


Fig. 2

Fig. 1.



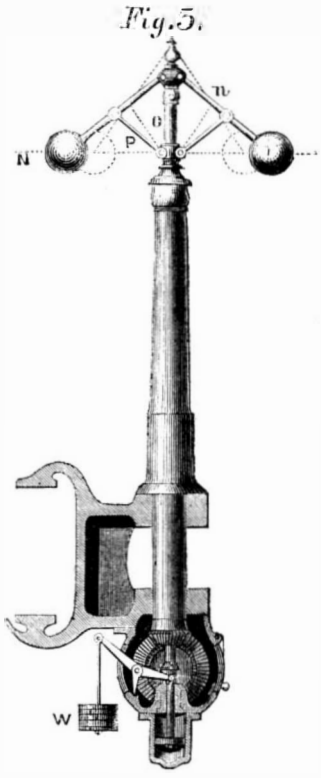
The universal experience in this country and Europe is in favor of the slide valve for opening and closing the ports of all quick moving engines. It is simple and easily fitted, admits of the least lost space, opens and closes the ports with the quickest possible motion, and is the least liable to become leaky from use of any form of valve. Of the two forms of slide valve the flat is much preferable to the curved, from the greater facility of accurate fitting, and the more equal wear of two planes as compared to inner and outer cylindrical surfaces.

An important condition of equal wear in a slide valve, however, is a constant travel. Where the induction valve is made also to act as a cut-off valve, as in a link motion, and in detachable valve gear, this condition cannot obtain, and as a consequence we find that such valves are always wearing leaky.

The adaptation of a cut-off mechanism to act in conjunction with a plain slide valve. the latter to admit and exhaust the steam, and the former to close the port at any desired point in the stroke, has been a favorite pursuit of engineers for the past half century, but in all arrangements previous to the invention of Babcock & Wilcox, the motion of the main valve had more or less effect upon the action of the cut-off, and the latter would not work with the desired rapidity at all points, nor would it admit of a range of motion throughout the stroke of the piston. Nine-tenths of all the expansion engines now built in Europe have some modification of this form of valve gear, and the engine of Messrs. Farcot & Sons, which received the Grand Prize at the late Paris Exposition, was of this class.

One of the points in which the Babcock & Wilcox engine differs from the best engines which have preceded it is the manner in which the cut-off valves are operated, viz.: by the action of the steam itself, independent entirely of the action of the main valve; thus insuring an instantaneous, positive, and easily controlled cut off, at any desired point in the stroke of the piston. The distribution of the steam to the alternate sides of the piston, and its release from the cylinder when the stroke is completed, are performed in the manner most approved by experienced engineers, by means of a plane slide valve operated by the ordinary eccentric. But from the fact that the induction valve has in no case to effect the suppression of the stream—or, in American phrase, act as a cut-off valve—and from the further fact that the cut-off is actuated independently of the motion of the main valve, the functions of "lead" and "cushion" can be adjusted to any desired degree, without in any manner affecting the action of the cut-off valve. This is an important distinction between the operation of the main valve of this engine and those which have preceded it. In the ordinary three-ported slide valve, or in any other arrangement where the several functions of *lead*, *out-off*, *release*, and *compression*, or closing the exhaust, are dependent on the motion of one eccentric, the "exhaust',

Fig. 3.



functions—*i. e.*, the release and compression— must always be subservient to the "steam" functions—*i. e.*, the lead and suppression, or cut-off.

In the Babcock & Wilcox engine, however, the cut-off being actuated by a separate and entirely independent mechanism, a single valve is capable of giving any degree of lead and compression which may be desired, as perfectly as with the most complicated valve gear.

Another important difference between this engine and all previous adjustable slide or rolling valve cut-offs, lies in the fact that the valves have a constant travel under all circumstances, thereby insuring an equal wear. A valve which varies its throw to effect the cut-off, as in all detachable valve gear, cannot wear equally, and has a continual tendency to grow leaky. Again, this constant throw insures a wide, open port, and the least loss through throttling the steam by the action of the valve—or, in other words, enables us to obtain a pressure in the cylinder more nearly approaching that in the boiler, than can be realized with other valve motions.

Another peculiarity of this engine is its extreme simplicity and the fewness of parts exposed to wear. At first sight, it has the appearance of one of the simplest styles of non-expansive engines, having none of the catches, cams, dash-pots, springs, tappets, etc., which are common to other expansion engines. With the exception of the cut off gear, the

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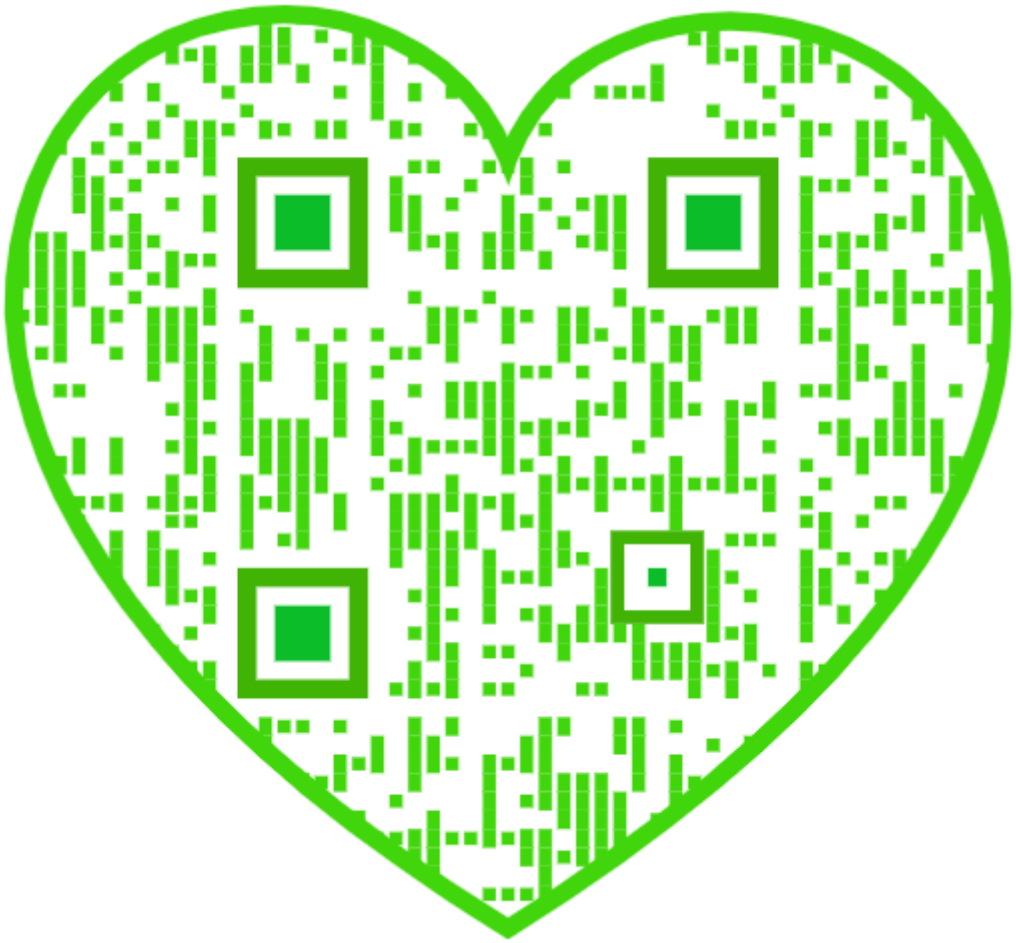

engine is a simple slide-valve engine, and can be used as such, should any accident occur to the cut-off. The cut-off mechanism itself is also of the simplest possible description, having the least possible number of parts, consistent with a proper performance of its functions. It consists of two cut-off slides, a miniature steam cylinder, and a valve for controlling the admission of steam to the same. This small cylinder, being enveloped in the steam, requiring no packing, and having only the weight of its piston to produce wear, is, for all practical purposes, indestructible. The cut-off slides are always balanced when they move, consequently they are not exposed to injurious wear.

Another advantage of the Babcock & Wilcox engine is that it is easily comprehended by ordinary mechanics. The motions and adjustments are similar to those familiar to any one who understands a plain slide-valve engine; and any man who can adjust such an engine properly, can readily adjust this.

The cut-off valve of this engine presents a convenient means of stopping at any desired point, simply by opening or closing the cut-off valve by hand, as the case may require. The engine may be warmed up, also, without danger of starting, by closing the cut-off valve by hand. In cases where it is desirable to back the engine, a starting bar may be readily shipped and the engine handled with the same ease as the plain slide.

The bed or framing which has been adopted for horizontal engines is of the form first introduced by Horatio Allen, Esq., of the Novelty Iron Works. It is bolted to the end of the cylinder, and extends to the pillow-block, and the metal is so disposed as to give the greatest rigidity with the least weight. The cross-head is upright, and is supported on flat slides, a drip cut cast on the bed serving to catch all drippings, not only from the slides, but from all the stuffing boxes.

The regulator or governor is driven by gearing, thus avoiding all danger of breakage or slipping of belts, and the consequent damage to the engine and machinery from the "running away" of the engine.

In addition to the steam jacket for preserving the temperature of the cylinder, a covering of felt is employed around all the exposed parts, and this in turn is covered by a casing of polished metal. The latter is the best possible protection against loss by radiation.

In the construction of these engines, no pains or expense is spared to procure the best material and workmanship, and the proportions and relative strength of all the parts are calculated with the utmost care, from formulas based on long experience, as well as a thorough knowledge of the qualities and peculiarities of the materials. Great attention is also paid to giving artistic forms to the various parts, every piece being designed with reference to rigid simplicity and a cultivated taste.

The largest engraving gives a perspective view of the engine.

Fig. 1 represents a horizontal section of the cylinder and valves, showing the peculiarities of the cut-off motion. A, is the cylinder which is steam jacketed as are also the heads. B, is a portion of the bed piece, which forms also the front head of the cylinder. C is the piston and C' the piston rod. D, is the main valve, e e' the induction ports, and F, is the exhaust port. The body of the valve is hollow and conveys the exhaust steam from either end of the cylinder alternately to the exhaust port, F, whence it goes into the exhaust pipe. The steam passes through ports e' in each end of the valve, into the induction ports of the cylinder, alternately as they are opened by the motion of the valve derived from an eccentric in the usual manner. On the back of the valve at either end is a slide, G, which can be made to cover the port at that end, and these slides are each attached to one end of a piston, H, fitting in a small steam cylinder bolted to the back of the valve, and so adjusted that when the port in one end of the valve is closed the other is open. Upon steam being admitted to either end of the piston, H, the piston is shot over and the corresponding side closed to cut off steam from that end of the main cylinder; while the port at the other end of the main valve is opened ready to admit steam to the other side of the main piston when the valve shall arrive at the proper position.

It will be observed that the cut-off slides, G, are always balanced when moved. The one about to close having steam of equal pressure upon each side, while the other one has been balanced by the main valve riding past the end of the valve face on the cylinder, thus admitting steam behind the slide, G. This condition obtains during the whole stroke of the piston until the steam is cut off, after which the cut-off slides, G, remain stationary relatively to the main valve until ready to cut off steam on the return stroke, previously to which time they have been balanced by the over-riding of the valve at the other end. These slides, have, therefore, literally no wear, and once fitted tight, they will remain so indefinitely. The piston, H, in the small cylinder, is turned to fit, and has no packing, neither have the rods stuffing boxes, as the pressure is equal on both sides except during the inappreciable time which intervenes between the exhausting of the cylinder, I, and the movement of the piston. The only tendency to wear in these parts is due to the weight of the piston and rods, which is supported on large surfaces. In fact, after twenty months constant use, none of these parts have worn sufficiently to obliterate the tool marks upon the surfaces.

Steam is admitted alternately to each end of the piston, H, at every revolution of the engine, causing the cut-off slides to move at every stroke, cutting off the steam at the point determined by the governor.

Fig. 2 shows a cross section of the cylinder, I, and its valve. This valve is balanced by the plate, J, upon its back and is operated by a toe upon the rock shaft, L, carried upon the main valve, and extending through the end of the steam chest where it receives motion from a crank, M, which is adjusted in its position by the governor. The exhaust ports of the cylinder, I, are made upon the bottom and are at a little distance from the end, while the steam ports are upon the side and at the extreme end of the cylinder. By this arrangement the piston closes its own exhaust port and cushions on the remaining distance, thus dispensing with all dash pots or air cushions, and causing the valve to work without any noise.

The valve, i, being balanced, and the rod, L, carried through its stuffing box by the main valve, there is the least possible power required by the regulator to adjust the crank, m, thereby ensuring a more sensitive action than can be attained where the governor has labor to perform.

The governor is peculiar and is shown at Fig. 3. The balls, N, are hung upon arms in the usual manner, which arms are jointed at their upper ends to a head attached to the rod, o, which slides within the hollow shaft that drives the balls; the motion being communicated through the radius rods, p, which are jointed at their lower ends to the gearing shaft, and at their upper ends to the center of the arms, n. The rods, p, are half the length of the arms, n, measuring from the center of the ball, and it will be readily seen that in consequence of this arrangement the arms, n, and rods, p, form a parallel motion and compel the balls to move outward in a horizontal plane.

In the ordinary pendulum governor the balls move in the arc of a circle and rise as they extend. It therefore requires an increased speed to maintain them in their advanced position. The engine must consequently run faster when the load is light than when it is heavy, and such is the case with all ordinary governors. In this improved governor it will be seen that the gravity of the balls has no tendency to move them in either direction, and exerts no influence whatever upon the speed of the engine. The centrifugal force causes them to diverge, and a weight, W, tends to bring them towards the shaft. When therefore these two forces are in equilibrium the balls will remain in the same position, but as either preponderates they are moved in a corresponding manner, thus affecting the speed of the engine by varying the amount of cut-off. The weight, W, is supported upon a bent lever which is so proportioned, that the centrifugal force at any given speed will just balance the weight in all positions. The speed of the engine, will, therefore, remain at that fixed point with all variations of load or pressure of steam; for any increase or diminution will cause either the balls or weight to preponderate and the point of cut-off to be changed until the speed is again brought to the standard where the two forces are in equllibrium.

Any desired speed can be obtained by altering the weight, W, and the action of the governor will be as perfect in one case as in any other. A spiral on the rod, o, serves to advance or retire the crank, m, relatively to the main crank, so as to cause the cut-off to occur earlier or later in the stroke, as the balls diverge or converge; and the amount of this adjustment is such that the cut-off may be varied from nothing to seven-eighth stroke. [See Advertisements on page 270.]

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Late Explosion in New York City.

Messrs. Editors:—After a careful and reflective examination, I have come to the conclusion that the steam boiler disaster in Twenty-eighth street was not an explosion, but that the boiler gave out and was carried to the place where we found it by the ordinary pressure of steam. I find the rupture was in the strongest part of the boiler—the tube cylinder—which was 52 inches in diameter and 7 feet long, made of 5-16 iron, which was of good quality. The outside shell was 96 inches in diameter and but 4-16 thick. Now, taking the diameters of the two into consideration, and the extra thickness of the iron of the tube cylinder, I find it capable of sustaining fully double the pressure per inch that the outside shell could; yet the outside remained entire.

There is nothing to indicate a lack of water in the boiler, but the most conclusive evidence that there was a full supply. Had there been a lack of water, the boiler would undoubtedly have been destroyed, but its subsequent flight, the destruction of two lives and a dwelling house 150 yards distant would in all probability not have been the result.

This seems perhaps paradoxical, but if we examine the construction of the boiler which our readers will see illustrated on the first page of this journal dated July 9th, 1867, we will see that it is of that type of boilers having a large fire surface with a very small water space, particularly in the tube cylinder, which is on one side exposed to intense heat outwardly, while the heat returns through the tubes internally. In the upper half of this cylinder, probably, the major part of the steam was generated, which of course must find its way to the steam reservoir in the top—the water spaces being small around the tubes—the water was necessarily forced out by the steam, the iron heated—the water returns on the heated iron—thus alternately expanding and contracting the plate of the cylinder most exposed to the intense heat of the furnace, while its attachment to the main part of the boiler being less exposed to heat, was expanded less. This alternating continually weakens, disintegrates, finally destroys the strength of the iron, and it gives out in the strongest part!

I have said that there was no evidence of a lack of water. This is proved by the fact that the crown is one foot or more above the top flue sheet of the inner tube cylinder, showing no marks of overheating. This crown sheet is flat, sustained by suspension stays from the top. It was intact—no depression in any part, nor any marks of overheating, while the tube sheet of the cylinder showed most unmistakable evidence that when the rupture took place, that and one half the length of the tubes and one half of the shell of this cylinder were *red hot!*

With regard to the elevation and flight of the boiler, if we assume the boiler had 60 pounds of steam to the square inch, this multiplied by the area of 96 inches (the diameter of the outer shell of the boiler), gives us an ascensive power of nearly 218 tuns, while the parts of the boiler that ascended weighed but about four tuns.

Now there is ample evidence that the water and steam (and the water contained in the boiler would become steam when liberated) was still being discharged from the lower end of the boiler until it landed, acting precisely like the force of gunpowder being discharged by a rocket in its ascent.

Now taking this view of it, the escaping steam had to impinge on the atmosphere, which we will assume as 15 pounds per square inch, this multiplied by the area of 96 inches, gives us a propelling power of more than 54 tuns, against 4 tuns to propel.

Need we look after a *gas theory* to give these results? Is it necessary to invent any "mysterious" causes? I found the iron of which the boiler was constructed good, the workmanship unexceptional, but the principle on which the boiler is constructed wrong. F. W. B.

Artesian Wells in Illinois.

Messrs. Editors:—I crave a short space in your scientific journal for the purpose of asking a few questions that would perhaps interest some of your 100,000 readers, and may benefit the inhabitants of this section. Onargo, the point whence this comes, is located in central Illinois, 85 miles south of Chicago. It is in the center of what is known as the Artesian Well region. These overflowing wells can be produced within a radius of 20 miles at the depth of 70 feet, variations in surface allowed. Water is procured by boring with a six-inch auger through about 5 feet of soil, 10 to 20 feet of sand, 15 to 20 feet of blue clay, 20 to 30 feet of hard pan, a composition of blue clay and coarse sand or gravel, and as hard as baked pottery, and into a bed of white sand called "water vein." In this bed of sand the water is found, it will in many places fill the discharge pipe several feet above the surface, which may be conducted to any part of the farm by pipes. Onargo is 92 feet above Lake Michigan and higher than the surrounding country, and these wells are found on every farm, flowing a constant stream at an even temperature. The question is, where does this water come from? Some of these wells throw 20 gallons per minute, others 120. A gentleman well acquainted with this country and the numerous wells, estimates the amount of water brought to the surface in this district at 53,400,000 gallons per day; this is allowing but 50 gallons to a well per minute. Where does this water come from? It cannot come from the lake, as we are so much higher than that body of water. It cannot collect in reservoirs from the surface, because it is impossible for water to penetrate the stratum known as hardpan, that overlays the sand or water vein. In this vein, where the water is found, there are no vacuums, or lakes, or veins of water, or currents, but a hard and compact bed of sand, almost pure white. Now if this water does not come from the lake or surface in this vicinity, but its source is a body of water some distance away, would it not be necessary for it to be at a great hight to overcome the resistance it meets in traveling through this bed of sand? Say this old theory is correct, say that the source is 200 miles away and 200 feet higher than the discharge, would not the resistance it meets in traveling through this compact bed of sand so overcome the power it receives from the fountain head that it would fail to reach the surface? Or do you consider that this water is conducted through this sand on the capillary principle? and if this is true why is it that beyond a certain radius they bore to the bed rock and fail to procure water?

A great many other things I would like to ask, but I know I must be brief. We find peculiarities in every section of this great artesian well country, most of them worthy of note, which if collected would fill your paper a dozen times. If you want a map of this section, with number of wells and location, size of streams, etc, I will forward the same.

Ed. Rumley.

[We would be glad to receive from our correspondent any further information he may deem interesting.—Eds.

Turbines and Water Power.

Messrs. Editors.—For some time I have watched with peculiar interest for items relating to Hydraulics, especially in reference to the most economical use of water power, as I am about fitting up a mill where I have a fair water power. In your issue dated October 5th, I notice two statements purporting to be made by parties using the "Leffell wheel," which seem to me to be extremely improbable, viz., in one case where a turbine wheel of only 6 inches diameter had replaced two 20 feet overshot wheels and was doing more work on less water than they had been able to, and the other where a 10-inch wheel was running 3 pairs of large flouring burrs. Now I am pretty well acquainted with the amount of power required to do the work therein stated and that acquaintance leads me to believe that this is impossible, that it is impracticable for any such wheels to accomplish these results, especially with the small amount of water said to have been used.

Now if the Leffell or any other wheel can do what is there claimed, it is certainly important for all millers and manufac-

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turers to know it, but if as we think, it cannot be done, it is doing much injury to allow such statements to pass unchallenged, as they may mislead many, who, like myself, contemplate improvements, but who have neither the means or inclination to experiment on uncertainties or to take risks on the assertions of manufacturers of this or that article.

Allow me accordingly to ask your opinion or that of some of your multitude of readers, who are experts in the theory and practice of Hydraulics as to the possibility of a 6-inch turbine doing more work than two 20-feet overshots and as to the best way of applying water power generally. A discussion of this subject cannot fail to be of great advantage and may save much trouble and expense to many, as all through our country new water powers are being developed and brought into use, and even more attention would be given and capital invested in them, were there a more general knowledge of the subject. F. Wilber.

Philadelphia, Pa.

Our correspondent refers to an advertisement. Probably the parties whose names are appended to the document can furnish him with the information.—Eds.

End of the Comet Discussion.

Messrs. Editors:—The kindly manner in which Prof. Wilhelm, of Philadelphia, has taken exception to some features of my explanation of the philosophy of comets' tails, commands admiration; and yet I think he errs.

Comets, when in a fit condition for the production of a tail by aid of the sun's rays, are opaque and self-luminous, and are not "transparent gas," as generally supposed; hence all those rays from the sun, that strike the comet within the circumference of the opaque substance, are absorbed. Only those rays that impinge upon the luminous margin become reflected. Or, possibly, as the rays pass through the luminous envelope, they become surcharged with cometary light, and are thus made luminous and visible. Once the rays have passed the luminous margin, they again become obedient to the same law and power of transmission by which the same rays were originally conveyed from the sun to the comet.

That part of the professor's diagram marked "shadow," is shadow within the comet's tail. It is well known to astronomers that the tail is a hollow cone, with the apex at the head, and that the surface of the cone only is luminous. Now, I do know, that the tail expands as it lengthens, in obedience to the law of reflected or transmitted light; whereas a transparent sphere would refract rays like a double convex lens to a focus in opposition to the sun. Hence the tail can hardly be refracted light.

To Dr. Fullerton I beg to say that I fully believe in the "all-pervading ether theory;" but the "secular acceleration of Encke's comet" is owing to an entirely different cause.

New York. Geo. M. Ramsay.

Gravitation.

Messrs. Editors:—In reply to the inquiries of your correspondent, J. D. Caton, on page 194, current volume, I wish to say that Bassnett was not the first to propose a "mechanical explanation" of gravitation, while my hypothesis is anything but a mechanical one, in the sense of a transference of force from body to body by actual contact.

Newton himself did not believe in the inherent power of matter to attract other matter, and put forth the suggestion that an elastic medium pervades all space, increasing in density as we proceed from dense bodies outward; that this "causes the gravity of such dense bodies to each other; every body endeavoring to go from the denser parts of the medium to the rarer." The objections to this hypothesis are well stated by Whewell in his Bridgewater treatise; first, that we cannot find traces in any other phenomena of a medium possessing these properties; second, we have to suppose an inherent *repulsive* power in the particles of the medium for each other, and for dense matter. This supposition requires accounting for quite as much or more than that of simple inherent attraction, and is, beside, more complex. A subsequent theory, which excited much attention at the time, was proposed by Le Sage, in a memoir entitled, "Lucrece Newtonian," and further illustrated by M. Prevost, according to which all space is occupied by currents of matter, moving perpetually in straight lines, in all directions, with a vast velocity, and penetrating all bodies. These currents would be intercepted by gross bodies, which would thus be driven toward each other.

Mossotti more recently advanced a theory in which he attributed gravitation, as well as the attraction of cohesion and other molecular forces to a resultant force produced by a repulsion between the particles of matter; an attraction between matter and the etherial medium, and a repulsion between the particles of the latter. When the material molecules of a body are inappreciably near to one another, they mutually repel each other with a force which diminishes rapidly as the minute distance augments, and at last vanishes. When the molecules are still farther apart, the force becomes attractive. The limits of distance, at which the nature of the force changes, vary according to the temperature and nature of the molecules, by which is determined whether the body they form be solid, liquid or aëriform. This hypothesis, with some modification, is the one which is most generally received among physicists at the present time; and a nearly similar one has been recently discussed at some length by Professor W. A. Norton, in Silliman's journal.

The view which I have taken is, it seems to me, more simple than either of these, in the respect that it involves but one assumption instead of three or four to account for the same results. It is simply that force exists as a distinct separate entity, possessing quantity and direction, and only becoming cognizant to us when associated with matter, and producing motion. We arrive at the knowledge of its *independent* existence by reasoning upon these witnessed effects when so associated.

My plenum is of force and not of matter. Matter is merely a vehicle for force, and its inertia or weight is measured by its carrying capacity.

To sum up, in a few words, the substance of the paper which I read before the American Institute, which will be published in full in their next volume of proceedings, matter has no properties except that of motion, when associated with force. Impenetrability, elasticity, &c., are the manifestations of *force*, and not the properties of matter. Attractions are the results of interceptions of force; repulsions those of the excess of momentum over attractions.

A recent writer in the *London, Edinburgh and Dublin Philosophical Journal*, under the head, "Conic Theory of Heat," advances a similar idea to one of those contained in my paper, and proposed by me two years ago, viz., that the three conditions of matter are due to elliptic, parabolic, or hyperbolic character of the molecular orbits, the first corresponding with the solid, the second with the liquid, and third with the gaseous form of matter. I have attempted to trace the forms of crystals to the elliptic (including the circular) character of their orbits, and to show that in the liquid condition the relations of the forces are such that the orbits would be parabolic in single pairs, and hyperbolic in the gaseous condition. Also, to show, that the "Clash of Atoms," so much talked about of late, is a physical impossibility, impenetrability not being one of the properties of atoms.

New York, Oct. 9, 1867. Henry F. Walling.

The Number "108."

Messrs. Editors:—I beg leave of presenting herewith a few words in addition to the article, "Extraordinary Coincidences," which I saw on page 227, current volume.

The number 108 itself is very remarkable. It is composed of the prime factors 2 and 3, thus: $2\times2\times3\times3\times3$. It is the product of the second power of 2 and of the third power of 3, and can be expressed thus: $1^1\times2^2\times3^3$.

Such a remarkable coincidence cannot be merely accidental; it must have some deeper foundation in the mysteries of astronomy, such as Kepler's law in relation to the radius of the orbits and the velocity of planets. I belong to the creed of those who believe that our planetary system has been formed of one great sphere of gaseous matter in such manner known as the hypothesis of La Place. The above remarkable number may have its foundation in the proportions in which the gaseous matter separated by centrifugal force into fragments, of which the earth, the moon, and other bodies of our planetary system have been formed.

At some future time I hope to publish something more interesting upon this subject, in connection with my hypothesis about comets mentioned on page 114, current volume.

J. G. Konvalinka.

Astoria, L. I.

How to Procure Information.

Messrs. Munn & Co., Gents:—To show the value of the Scientific American as an advertising medium, I give these facts: A gentleman from the interior came into my office recently and said he was anxious to possess a certain machine. He had spent a great deal of time fruitlessly in search of it and now desired my advice. I told him two lines in the "Business and Personal" column of your paper would bring him the needed information in a short time, if such a thing existed in the country. He wanted to return home in a day or two and if not successful by that time he would get me to attend to the matter for him. I drew up a statement of the facts, put it in your paper, and, sure enough, by the time your journal got to your readers and a return could reach me I had several letters giving all the information desired. My friend spent time and money in a fruitless search; a one dollar notice in the Scientific American brought it out at once.

A. W. M.

New York City.

Quick-Setting Cement.

Messrs. Editors:—I see that N. U. A., of Mass, enquires for a quick setting and durable cement. I can recommend Scott's Cement for that purpose, it is made into a paste with boiled oil and used in the same way as red lead, the joints are then warmed by putting on steam at a low pressure, which causes it to become quite hard in about three hours. It does not rust the faces of the joints like rust cement, and is much cheaper than red lead. It is much used in ocean-going steamers, and has been known on the other side of the Atlantic for twenty or thirty years. Yours truly, M.

Cincinnati, O.

Plaster of Paris on Millstones.

Messrs. Editors:—Your correspondent, S. J. T., of Ga., asks how to make his plaster of Paris stick hard to his mill stones. The following I have used with success on other articles. First boil the plaster till the bubbling ceases or till quite dry; then mix in a little powdered alum, then mix with water; apply quickly, as it sets rapidly, becoming very hard. Penrose Chapman.

Brunswick, Me.

Recipe for Welding and Restoring Steel.

Messrs. Editors:—For welding cast steel that has been repeatedly overheated, and restoring the same to its former nature, such as machinist's tools, chisels and all other articles, take of nice fine sand, 5 lbs., salt, 3 oz., copperas, 2 oz., as much blue vitriol as will stand on a quarter of a dollar, the same quantity of rosin as vitriol. Use as borax.

Portland, Me. George Jones.

The Science of Ballooning.

A French writer, M. F. Marion, has just issued a work on balloons and aerial voyages, giving a popular history of ballooning from the earliest times to the present day. M. Marion has taken the experiments in aerostatics in chronological order, and bestowed a good deal of pains in presenting his readers with an intelligible view of the improvements which have been made since the first voyage of M. Pilâtre des Roziers, who in 1783 ascended with the Marquis d'Arlandes in a Montgolfier balloon inflated by hot air produced by the burning of straw. An authentic account of the voyage was drawn up on the safe descent of the balloon in the environs of Paris, and was signed by Benjamin Franklin among other persons of distinction. When questioned as to his opinion concerning the utility of the invention, which many there present thought to be already in a state of perfection, Franklin replied, "'Tis the child that has just been born."

Although a great deal has been done, as far as the construction of balloons is concerned, and the method of inflation, we are very much in the same condition now as were our forefathers in everything that relates to steering them. Indeed, it is acknowledged that, with the exception of the possibility which accurate observations may afford of calculating upon and taking advantage of currents of air, there is no hope of our ever being able to control the direction of a balloon in the air; and it remains to discover some method of aerial navigation without balloons.

The services rendered by balloons to science are, however, by no means inconsiderable, and we at least in America know how valuable has been their aid in warfare. It was in 1794 that the French republic first established a corps of military aeronauts. The Committee of Public Safety had accepted a proposition of Guyton's to avail themselves of the services of a young doctor named Coutelle, who had offered to take observations in a balloon. Coutelle experienced much difficulty in carrying out his project. Sulphur being much wanted for powder, the government prohibited the production of gas by sulphuric acid, and Coutelle was obliged to have resort to Lavoisier's process for making hydrogen by the decomposition of water. Ordered to report his invention to General Jordan at Maubeuge, he was at first unable to make himself understood by that officer, who ordered him to be shot as a suspicious character. He managed to explain at length the real purport of his visit. Subsequently he made several ascents with two or three assistants in his balloon, the cords of which were held by the corps under his command. The Austrians repeatedly fired at the balloon, which escaped unhurt, and was subsequently successfully employed at the battle of Fleurus, and for taking observations at the siege of Mayence.

Napoleon does not appear to have favored the use of balloons in military affairs to any great extent, a fact which M. Marion is inclined to impute to the ominous circumstances attending the descent of a balloon which, under the direction of Garnerin, the Emperor's aeronaut, was sent up in Paris on the day of his coronation by Pope Pius VII., in 1804.

At dawn on the second day it was hovering over Rome, and the inhabitants viewed with consternation the strange body which they saw sailing between the cupolas of the Vatican and St. Peter's. Suddenly it fell and touched the earth twice, and then impelled by the wind rose again, and was finally submerged in Lake Braciano. The place it had touched was the tomb of Nero, and before it had succeeded in regaining its free flight a portion of its crown had been torn from it and left on the tomb.

On the eve of the battle of Solferino an ascent was made by one Godard; but ballooning, as applied to warfare, first began to receive real attention in the war in the United States, where Mr. Allan, of Rhode Island, conceived the idea of communicating with the earth by means of a telegraphic wire. Shortly afterward Professor Lowe sent the first message by this means from the balloon "Enterprise," above Washington, to the President, and an ascent which furnished valuable information to the army of the Potomac was made in September, 1861, under the direction of Mr. Allan. Ballooning is at the present time extensively practised in Paraguay with a great deal of success, and has afforded great aid to the Brazilian commanders in overcoming the difficulties attending the manœuvres of an army in that flat and densely wooded country.

The plates in this volume are by M. P. Sellier, and are as well executed as they are curious and appropriate. The simple unsightly machine of the present day, which we know as a balloon, is a very different thing to the gorgeously decorated and magnificently colored globe in which the Marquis d'Arlandes and Pilâtre des Roziers made their first voyage.—*Evening Post.*

A Musical Prayer Book.

In Philadelphia, one pleasant Sunday evening, an old lady whose failing eyes demanded an unusually large prayer book, started for church a little early. Stopping on the way to call on a friend she laid her prayer book on the center table. When the bells began to chime she snatched what she supposed to be her prayer book and started for church. Her seat was at the chancel end of the gallery. The organ ceased playing. The minister said: "The Lord is in his holy temple, let all the earth keep silence before him." In the effort to open her supposed prayer book, she started the spring of the music box which she had taken instead. It began to play—in her consternation she put it on the floor—it would not stop—she put it on the seat, it sounded louder than ever. Finally she carried it out, while it played the "Washing Day," an Irish jig tune.

The dollar weighs 412½ grains; of these 41¼ grains are copper. The copper is one ninth of the silver.

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The Profession.

The true engineer is so imbued with the faith in the greatness and abstract goodness of his profession, that he can hardly believe there can be too many engineers. The essence of all engineering is thought, and that of the most valuable kind, not only when regarded in its material aspect, but valuable also when considered in relation to its beneficent and Christianising tendencies. Half the world, possibly nine-tenths, still believe, and will always believe, in mental apprenticeship, and in the routine of mental impartation; in other words, that a youngster of average dullness can, by pupilage, become a good routine engineer, and thus gain a a living for himself, as the be-all and the end-all of his profession. As well might we apprentice a youth to Tennyson that he might become a poet, or to Gustave Doré that he might become a painter of the grand and the terrible. Engineering has its thousand formulæ, and these any studious mind, of a practical turn, may master; but the mastery of all of them will not make the engineer, in the higher sense of the term. With their knowledge alone he may become a private, or even a non-commissioned officer, but never a captain, still less a general, in the great army of engineers. True, as in all other armies, engineering must have its rank and file, and there will be men who can only know and can only do what they are told, and whose whole idea of duty lies in obedience to command, and we would speak with all respect of these men. The engineer whose own mind is all alive with origination and expedients, and who can gain a given end by a dozen different roads, must always respect his faithful assistant, who, with an undying devotion to duty, will scrupulously carry out his orders, working day by day, and, if need be, night after night, copying, filling in details, tracing, taking out quantities, measuring up work, calculating strains and resistances, performing, in short, all the routine of design, and that contentedly at from 30s. to three guineas a week, and who, even with a wife and a little constellation of children, subsists honestly and decently upon his salary, and has generally, if not always, something between him and want. How much the great engineers owe to the conscientious care, the persistent industry, and critical and accurate habits of thought of their assistants can never be fully known; but those who are deep in the experience of our profession know how truly this assistance is indispensable to the success of every great master of our art. To him such assistants—and there are many yet, after all that is said and all that must be admitted of professional degeneration—are what brave and faithful soldiers of the line are to the great general, the victories of whose army are individualised in his own name. None who realize the triumphs of British engineering should forget how much of the brunt and hard drudgery that won them has been borne by the engineering assistants of this kingdom; many of them noble fellows, recruited both from this side and the other side of the border, and from the sister isle. It is these poor fellows, just now, who, while their "governors" are racking their wits to discern the direction of future investment, when new companies will float, and what new phase of engineering will pay, are wondering whether the clouds will ever lift, and whether the great offices in Westminster will ever again be alive with the cheery hum of paying work. The assistant has his own thoughts, and he knows full well that all our modern periodical accesses of national prosperity have been based upon the development of some great material discovery, and that we are not just now in want of new railways, new harbors, new steamships, nor monumental engineering of the grander sort. Even the bolder and original flights of engineering have become tame. There are plenty now who can float a railway over a fathomless bog, or tunnel two miles under a lake, or span a chasm half a mile wide at a single leap, or unwater a mine drowned to its uttermost depths, or take a railway and its rolling stock up an Alpine steep, or put in a pier in a hundred feet of water and mud, or stop a rushing torrent where a sluice has burst in treacherous ground, or perform any one of the hundred miracles which have given such lustre to our profession. We would be glad indeed could we foresee the direction and results of the next great campaign of engineering in the unknown. For the sake of the thousands of our rank and file, who have chosen our profession for life, and who have before now taken its overwork in honest earnestness, incurring all the risks of premature decay, of breaking down long before the allotted time of nature, we would, if we could, point out the precise direction from which they may expect fresh and profitable employment; for the heart always jumps with the nimble and prosperous hand. We can only say, broadly, that great future prosperity must be looked for in fresh discovery and invention, and in this British genius has been too long fertile to allow us to doubt that new and still unexpected sources of wealth will be found. As it has been before, so it will be in time to come, that the improbable and unlikely of to-day, or rather that which but few far-reaching minds can recognize as likely or propable, will nevertheless give the greatest return in general prosperity.—*Engineering.*

The Names of Coins.

At the present time, when the acts of the "International Committee for a uniform currency," have excited so much interest in all parts of the world, and particularly in the United States, perhaps a few words in reference to the names of the coins now, or formerly in use, may be of interest.

The American dollar is derived from the German "thaler" (literally, "Valley piece," the first thalers having been coined in Goachimsthal, in Bohemia, where there are extensive silver mines). The same name is also used in Sweden and Denmark, where the unit of currency is called a rixdale or royal dollar. As for the sign or abbreviation of dollar ($), authorities are divided as to its origin, but it is generally admitted that $ was originally written with the S on the U; but for the sake of celerity, it was considered to be expedient to change the U to two strokes through the S, which has remained the accepted sign.

The American mill, cent, and dime, the French centime and decime, the Italian centesimo, the South American centaro, are terms derived from the Latin, denoting the thousandth, the hundredth, ard the tenth part of the unit of currency. When the Italian cities were at the hight of their power in the middle of the sixteenth century, their coins naturally spread over the world, and their names were taken for the coins of many other countries, thus the world-renowned Florentine *florin* (in Italian florino, so called from the flower, the lily of Florence, being on the reverse of every coin) was adopted by the French and English, who also give the same name to the German coin *gulden*—derived from geld money. The Venetian *seguin*, in Italian zecchino—from *zecco*, a mint—was adopted by most of the Oriental countries with which the Venetian merchants trafficked.

The Milanese ducat was taken into France and Naples when the armies of these countries overran Milan. The Neapolitan *carlino* is a small coin, with the head of Charles on it. The Roman *scudo*—in French—took *écu* its name from the *shield* originally placed on this coin.

Another Italian coin which spread over Europe was the Roman *grosso*, called in England a grote, in France a *gros*, in Bremen a grote, and still retained in Prussia and Saxony as a little groat or *groschen*. The French *sou* is evidently derived from the Italian *soldo*, or piece with which one can solde or pay one's debts.

The Hanseatic towns also furnished coins, witness the *mark*, so called from the Government *mark*, that it was of good weight. The *schelling* of Hamburg was adopted in England, where it is called a *shilling*, and also by Denmark and Sweden, where they call it a skelling.

Many coins derive their names from the marks or signs, printed on the reverse, and retain the name, although the sign may have been disused. Thus, a coin which has a crown on the reverse was called an *écu* in French, a *crown* in English. A piece which had a cross on it is called a kreuzer in Germany (from the German word kreutz—a cross); although no signs of a cross can be discovered on the modern kreutzer.

The English "pound" was originally a pound of money; but it has been gradually reduced to present form, and called a "*sovereign*," from the sovereign's head being on its face.

In France, during the reign of Louis XVI., there was a coin called a *livre*, or pound, which the republic adopted as the unit of currency, changing the name to that of *franc*, which it still retains.

When the Kingdom of Italy, and more recently the Papal States adopted the French system, they retained the old name of *livre*—in Italian, *liva*, and made that the unit of currency, so that the *franc* of France, and the *liva* of Italy are of exactly the same value.

The "Napoleon" or "Luis," of the French is simply a conventional name given by the French to a twenty franc piece; in the same manner as the Americans call a ten dollar piece an "*eagle*," and as the Prussians have a "*Frederick*." The English guinea derived its name from the fact that the gold from which the first guineas were made came from the Guinea Coast. The English *farthing* is so called from its being the *fourth* of a penny; the derivation of the Spanish *cwarto* is the same, the cwarto being the quarter of a *real* or royal piece.

The names of the South American coins are mostly of Spanish or Portugese origin; the peso, or Reru, is a piece that *weighs*, from *pesar* to weigh; the *centaro* is the hundredth part of the unit of currency, and the *rei* of Brazil is a royal piece. From the above mentioned facts it will be seen that the tendency of all nations has been to adopt the coins of other nations; witness the groat which traveled from Italy to England, France, and Germany.

Sometimes the value was altered, for instance there is a florin in Bavaria worth 40 American cents, and divided into 60 kreutzers, while in Austria there is one of the value of 50 American cents, divided into 100 kreutzers.

To give an idea of the difficulties a merchant doing business with Germany has to encounter, it must be remembered that there are five distinct coinages in use in that country, namely: Prussia and Saxony who use *thalers*, worth 75 cents, divided into 30 groschen; Hamburg, with marks of 30 cents, divided into 16 schillings; Bremen, with its *groten*, and Austria and Bavaria before mentioned.

In Italy the same state of things existed until the establishment of the Italian Kingdom in 1860. Several years ago the French Government proposed to the States whose coinage was the same as hers, namely, to Belgium, Switzerland, and Italy, that the coins of one should pass without dimunition of value in the territory of each of the others. This proposal was immediately accepted by these countries, and by Rome some time after. It is this arrangement, called in Europe "La Convention Monetaire," which is is proposed to extend so as to make a universal currency.—*Cor. Commercial Advertiser.*

Bronzes.

The art of casting in bronze is of great antiquity; it is stated to have been practiced by the Eastern nations long prior to its introduction into Europe. The Chinese historians say that Yu, who was associated on the throne with Chun, 2,200 years before the Christian era, caused nine brass vases to be cast, upon each of which he had engraved the map and description of the nine provinces of the empire. That the art was much practiced by the ancient Greeks and Romans, and that they attained to the greatest perfection in it, is well proved by the celebrated monuments of their work which remain. The finest collection of ancient bronzes is at Naples; among the specimens there are some showing the very curious manner in which the ringlets of hair, worked separately, were fastened on; many of them are the size of life. Bronze casting in Greece seems to have reached its perfection about the time of Alexander the Great (330 B. C.) The accounts given of the works executed about that time almost exceed belief. After Lysippus, the favorite sculptor of Alexander, who executed, according to Pliny, about 600 works—the art began to decline in that country.

The taste of the ancients was still preserved in Italy in the fourth and fifth centuries, and many important works in bronze casting are recorded as having been achieved by them at that early period. In France, Germany, and England, objects cast in bronze have also been discovered in the tombs of the fifth, sixth, and seventh centuries. During the three following centuries this art seems to have declined, and been little practiced in the Western countries, for we read of no great works being produced by it until the beginning of the eleventh century, when it was revived in Germany under St. Bernard, Bishop of Hildesheim, who had the gates of his church cast in bronze, and who erected, in the year 1022, on the space of it, a bronze column about fifteen feet high, ornamented with bas-reliefs ascending spirally from the base, depicting the life of Christ, in twenty-eight groups.

In France, the revival of this art was of a still later period, the earliest evidence of it being the gates of the church of St. Denis, which were cast in bronze under the direction of the Abbot Suger in 1140, and were enriched with bas-reliefs illustrating Christ's Passion and Resurrection.

Italy furnishes no important evidences of the revival of bronze casting prior to the end of the twelfth century, when Bonano produced the bronze gates of the cathedral of Pisa, and soon after those of St. Martin of Lucca, the large gates of the cathedral of Monreale were also executed by him, and bear his name inscribed on them. Many of the objects used in religious services in Germany, France, and Italy, were made in bronze during the twelfth century, such as candlesticks, candelabra, baptismal fonts, and some of the vessels for the altar. Important specimens of the work of this period are still to be seen in the different churches. The Medieval and Renaissance periods also produced for the same purposes numerous specimens of bronze casting; but as these pieces were always more or less enriched with precious materials, they belong more especially to the goldsmith's art.

Italy possessed, in the sixteenth century, a great number of celebrated artists, who designed and executed with incredible rapidity, statues, groups, monuments, and fountains in marble and in bronze. There were many also who reproduced in bronze, miniature bas-reliefs and statuettes, either from the antique or from the works of cotemporary masters. Florence was most renowned for these works. The pupils of John of Bologna reproduced, in bronze, statuettes of the numerous works of their master. Many of these beautiful statuettes and fine bas-reliefs are found in the collection of the present day, and are much sought for by amateurs. These artists did not disdain to employ their talents on the improvement and decoration of objects of ordinary domestic use; in the museums and private collections of the present day there are many beautiful specimens of their work, such as candlesticks, firedogs, knockers and handles for doors, inkstands, etc., which are justly valued as objects of art.—*London Builder*

The Pickpocket's Art.

If we are to believe a writer in the *Revue des Deux Mondes*, the art of picking pockets has been carried by the thieves of Paris to a perfection which must excite the envy of the rascality of London. It should be observed, by the way, that the English word "pickpocket" is now naturalized in the French language; perhaps because this particular form of plundering was, until lately, a comparatively rare crime in Paris, or more probably because it was comprehended in the class of thieving in general. At any rate, we should imagine that picking pockets must now be set down as an art requiring the most laborious practice for the achievement of its highest flights, if the skill with which it is accomplished in the Parisian omnibuses is to be taken as a sample of the perfection already attained. We are told that the thief, of course well dressed, enters the omnibus armed with a very small morsel of lead attached to a very fine thread of black silk. The extremity of this thread he holds between his forefinger and thumb, and as soon as his nearest neighbor takes out his or her portmonnaie for the purpose of paying the fare—which is paid in Paris on entering the omnibus—the thief, his eyes of course apparently fixed in contemplation on some far-off object, dexterously launches the bit of lead into the port monnaie just as the owner is closeing it. The purse is then returned to the pocket of the unconscious owner, who never sees the thread, by which it is now in the power of the thief. As soon as an opportunity offers, or is provided by the thief himself, who tumbles, apparently clumsily, against his neighbor at the first stoppage of the omnibus, the purse is gently withdrawn from its owner's pocket, and transferred to that of the rogue, who as soon as possible leaves the conveyance, with a polite salutation to his victim and the rest of the travelers. The feat certainly does seem to border on the incredible. Nevertheless, it is vouched for on the most respectable authority, and after all is not more wonderful than the feats of Indian jugglers of common skill.

THE models in the Paris Exposition show that Denmark was the first to adopt the principle of breech-loading, and also of rifling. The oldest rifled gun dates from the middle of the eighteenth century. It is made of gun metal, is a muzzle-loader, and has a length of five feet. It has eleven grooves of a partly circular form, and nearly an eighth of an inch deep.

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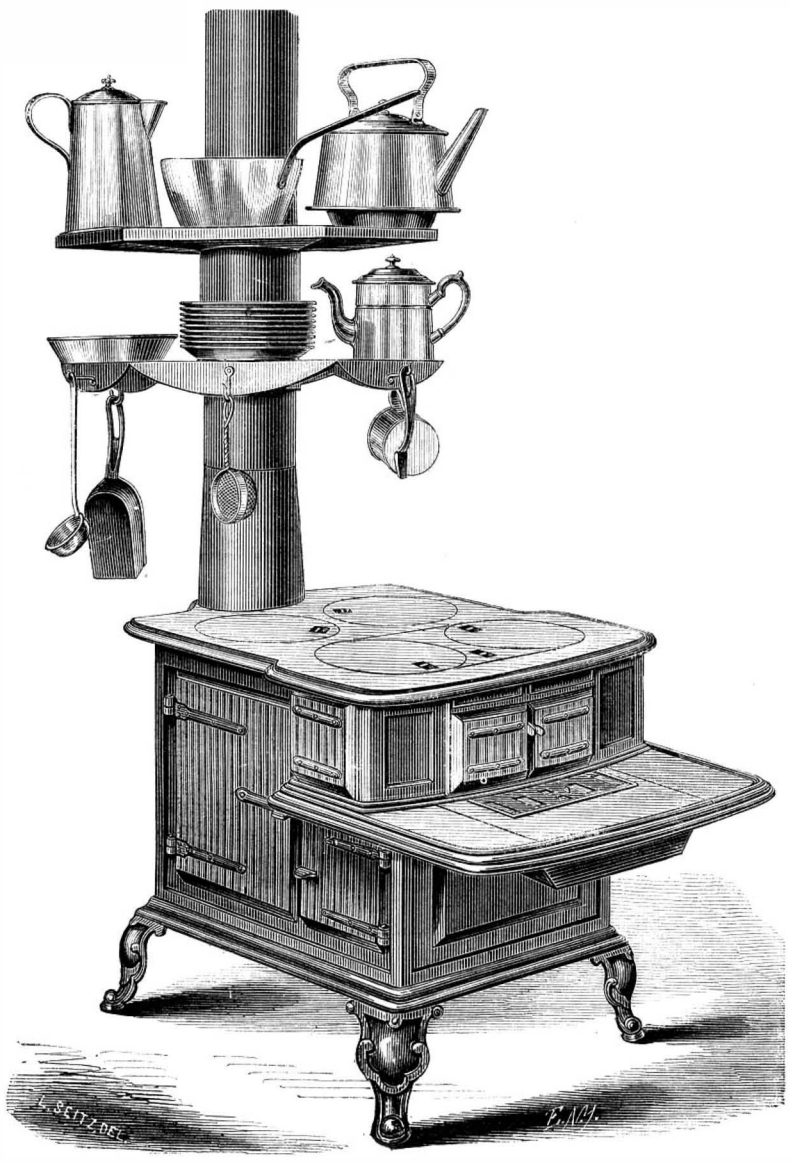
Convenient Appendage to the Cooking Stove.

The device represented in the engraving is intended for the convenience of the cook, and appears well adapted to save many unnecessary steps and much time now wasted. The engraving very plainly shows its construction and appearance when in use. It is simply a series of shelves arranged around the stove funnel within easy reach of the cook, and designed to hold cooking utensils, table ware, and stove implements. A cast-iron ring, either whole or in parts, is attached to the pipe by rivets or other means, and fastened and resting on it are several annular plates which can be rotated. To these the shelves are secured, which may be made sufficiently strong to support any weight it may be desirable to place upon them, although they may be further supported and strengthened by braces. The shelves may be circular, polygonal, or of any form desired, and may be furnished with hooks for suspending such articles as skimmers, shovels, etc. The advantages of this device are sufficiently obvious.

It was patented July 23, 1867, by John Turner, who may be addressed relative thereto at Marshalltown, Iowa.



TURNER'S STOVEPIPE SHELF.

The Lucimeter.

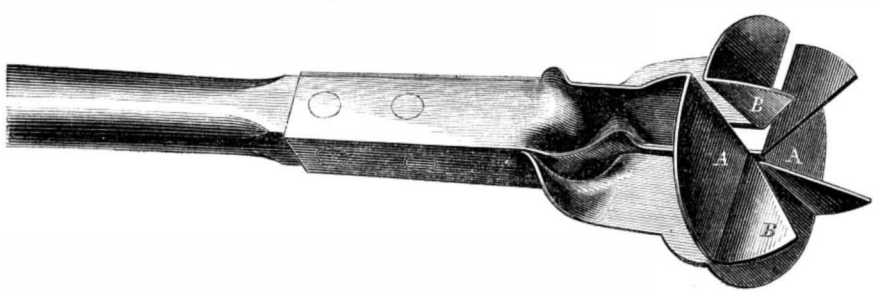
The various ways of measuring the quantity or intensity of light have always been a matter of paramount interest to philosophers. The earliest contrivance, and certainly an excellent one, due to Count Rumford, consisted in intercepting the light received from a given source, by means of a certain number of plates of dulled glass; the smaller the number required to make the light disappear, the smaller, of course, was its intensity. This was called a photometer. Others have since been constructed on various principles, but they are not generally applicable to one of the commonest problems that occurs in trade —viz., measuring the quality of burning oils by their illuminating power. This, *Galignani* informs us, has now been satisfactorily accomplished by M. Guérard Deslauriers, whose apparatus, which he calls a "lucimeter," consists of two constant-pressure lamps, and a photometer constructed on a new principle. Its shape is triangular; it is made of sheet iron painted black, and varnished, and is divided into two equal compartments. The latter are turned toward the lamps; the observer stands on the opposite side, which presents nothing but a flat vertical surface pierced with a hole bisected by the partition. Each of the two lamps is so placed as to transmit its light to one only of the two compartments, and exactly to the part where the hole is. The latter is covered with a piece of transparent paper on which, therefore, the rays of light from the two lamps are contiguously depicted. If their intensity is the same, the eye of the observer will perceive no difference; if there be any, on the contrary, one of the lamps must be brought nearer or removed further off, until the same intensity be obtained. The difference of distance will then mark the relative qualities of the two oils; which, combined with the quantity burnt in a certain time, is sufficient to determine their marketable value.—*Mechanics' Magazine.*

Improved Implement for Cleaning Boiler Tubes.

The brooms of corn, or wire frequently employed to remove the depositions in the interior of tubes or smoke flues in steam boilers soon wear, and refuse to support the weight of the head and its appendages. Something more rigid and self supporting seems to be needed. In the flues of a horizontal boiler the ordinary brush bears mainly on the lower interior surface of the flue; the upper surface, on which the unconsumed portions of the products of combustion are so readily deposited, are rarely thoroughly cleaned.

The implement shown in the engraving is composed of three or more segmental disks, the arms of which are springs. The blades, A, are in this case quarter circles, each with a projecting lip, B, curved on its outer edge to facilitate its entrance to the tube or flue. These blades are made of steel, spring tempered, and twisted as seen in the engraving, so as to yield readily in two directions. They are made of such a size as to overlap each other, their united edges thus forming an entire circle. It will be understood that the spring of the blades allows them to pass readily all irregularities, as rivet heads, and at the same time to bear against the entire surface of the interior.

Letters patent were obtained for this device, through the Scientific American Patent Agency, Dec. 18, 1866. Van Auken and Blanchard, manufacturers, Binghamton, N. Y., may be addressed for the article, or any further information desired.



VAN AUKEN'S DEVICE FOR CLEANING BOILER TUBES.

Turning the Bearings of Crank Shafts.

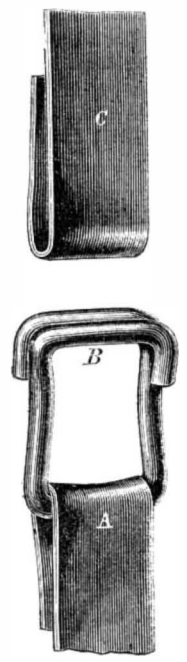
In an account in *Engineering*, of the Society of Engineers' late visit to the far-famed works of John Penn & Son, at Greenwich, occurs the following description of a machine for shaping heavy crank shafts, and turning the crank journals:

It consists of a massive bed—somewhat of a T form in plan —on which the heaviest crank shafts can be secured either transversely or longitudinally. This bed carries a large headstock, in which an annular casting revolves, being driven by suitable gearing. This casting, which is about 6 feet in diameter inside, is furnished with a pair of radial slides, to which tool-holders are fitted, these slides being arranged so that the tools can be set either radially or parallel to the axis of the revolving casting. The exterior of the revolving casting has a V formed on it, one side of this V fitting against a correspondingly shaped surface on the inner side of the headstock, and the other side bearing against a ring which can be adjusted to take up any looseness caused by wear. The headstock has a self-acting, traversing motion along the bedplate, in the direction of its axis, and the tool-holders have also a feed motion on the radial slides of the revolving casting. The manner in which a crank shaft is finished by this machine is as follows: The main body of the shaft is first turned in a lathe in the ordinary way, this being done to facilitate the setting of the work on the machine we have been describing. In this machine the throws of the crank are planed or shaped, and the openings of the cranks cut out, the crank journals or joint being also finished. For effecting the first of those operations, the shaft is placed on the bed of the machine transversely, so that one of the throws stands vertically opposite the headstock, the center line of the shaft being at right angles to the center line of the latter. This being done, the tools carried by the revolving ring or casting plane the surface of the throw by taking a series of circular cuts over it.

The cutting out of the cranks, and the finishing of the crank pins is effected by placing the shaft through the hollow headstock, and adjusting it so that its center line is parallel with, and on the same level as, the axis of the latter, and is distant from it horizontally by the amount of throw of the crank. At the same time, the headstock is brought so that it surrounds the crank to be cut, and the tools, carried by the casting revolving within the headstock, are thus enabled both to cut the opening in the crank, and, when this has been done, to finish the crank pin. One crank having been finished in this way, the work is shifted until the other crank is brought within the headstock. It will thus be seen that the process of cutting out the cranks and finishing the crank pin is just the reverse of turning, the work remaining stationary, and the tools traveling round it. When such heavy masses as large marine engine crank shafts have to be dealt with, it is much more convenient to treat them in this way than to chuck them in a lathe; and in fact, in the case of the largest shafts, it would be almost impossible to finish them by the ordinary process of turning. The consequence is, that these "hollow lathes," as they are sometimes called, are being gradually introduced in most large marine engine works, particularly on the Continent, where they are, probably, more generally known than they are in this country.

TRUMAN'S PATENT COTTON BALE TIE.

It having been shown that iron bands are greatly superior to rope for baling cotton, their use has become quite general, the main difficulty being to procure a handy, convenient, and inexpensive link or tie for securing the two ends of the iron band, and one which will allow the band to be doubled to the required length before insertion in the tie. It is inconvenient to pass the band through a solid ring or a tie punched from a plate and then bend it, the rigidity of the band often preventing it from being thoroughly tightened. If the bearings of the tie where the band passes through are edged or not round, the band under heavy strain may be cut. Furthermore the tie should be complete in itself with no loose parts to be lost or misplaced. Such seems to be the one illustrated in the engraving.



It is simply a bent iron rod and may be likened to a "sister hook" used on shipboard. The loop, A, of the band is passed through the space between the two ends of the hook, B, when it is turned and the loop, C, passed through in a similar manner. The rounding corners of the hook or tie facilitate this operation and when once fastened the square ends hold the band securely.

This tie is certainly cheap, can be easily and rapidly manufactured either by hand or machinery, is readily attached, and sufficiently strong to withstand any strain required. Patented through the Scientific American Patent Agency, Sept. 24, 1867.

All inquiries relative to the device should be addressed to to J. W. Truman, Key Box 21, Macon, Ga. See advertisement.

The Egyptian Lotus.

Mr. William Barr, of Bovina, Warren Co., Miss., says that the Egyptian lotus is to be found abundantly in the lakes of Louisiana and Mississippi. "A beautiful specimen was brought to me during the past summer from a lake on Big Black swamp in this county, the leaf of which was fully two-and-a-half feet in diameter, with a deep, cup-shaped cavity. It bears the largest flowers of any plant grown naturally in this country, with the exception of the *Magnolia Macrophylla.* Barlow, in his *Compendium Florœ*, Philadelphia, 1818, speaks of it as being within ten miles of Philadelphia."

In our issue of October 5th, we published a communication stating that the lotus was to be found in the waters of the Southern and Western States. An old tradition represents that eaters of the lotus forgot all that they had experienced —in fact that wakeful memory was annihilated—and on this Tennyson based one of his most beautiful poems, the *Lotos Eaters.* He uses, as *dramatis personæ*, a company of Greek warriors returning, as Ulysses in Homer's *Odyssey*, from the siege of Troy, cast on an island inhabited by the lotus eaters. He says these lotus eaters, finding the shipwrecked mariners, gave them the lotus to eat.

Branches they bore of that enchanted stem,
Laden with flower and fruit, whereof they gave
To each, but whoso did receive of them,
And taste, to him the gushing of the wave
Far, far away, did seem to mourn and rave
On alien shores; and if his fellow spake,
His voice was thin, as voices from the grave;
And deep asleep he seemed, yet all awake,
And music in his ears his beating heart did make.

They sat them down upon the yellow sand,
Between the sun and moon upon the shore;
And sweet it was to dream of Fatherland,
Of child, and wife, and slave; but evermore
Most weary seemed the sea, weary the oar,
Weary the wandering fields of barren foam.
Then some one said, "We will return no more;"
And all at once they sang, "Our island home
Is far beyond the wave; we will no longer roam."

We doubt the statement made by the imaginative poet, and that which tradition brings us; but there are so many varieties of this plant that it is difficult to determine which was meant in the *Odyssey*, or Tennyson's *Lotos Eaters*, as the statements seem to refer to some narcotic plant which may be only the poppy. A shrub in Africa bears berries which taste like dates, and is called the lotus. Another in Barbary bears a very rich fruit. In the interior of Africa, Mungo Park found a large tree called the lotus, which bore berries having a delicious taste, that, when pounded and exposed to the sun in cakes, made a delicious food. The *Nelumbium Speciosum*, or Egyptian lotus, is an aquatic plant, regarded sacred in the Egyptian theology, and also so regarded in India. What the uses may be of the variety found in this country we are unable to say.

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Editorial Summary.

Preserving the Teeh.—A correspondent advises us, from personal experience, of the efficacy of "biting a live black snake from his tail through his back bone" for rendering the teeth imperishable. The only member out of a family of seven, who has not false teeth and the toothache, he attributes his freedom from both misfortunes and the present soundness of these valuable members, after fifteen years' practice with them in cracking nuts and biting pins in two, additional to the ordinary duties of his dental apparatus during that period, to the wisdom exhibited in his early days in following the advice of a sagacions Indian, as above stated. He makes known the fact for the benefit of humanity and with a desire for obtaining some satisfactory explanation therefor. Notwithstanding our horror for the toothache and the inconvenience of wearing artificial masticating instruments we must confess that despite the assurance of our correspondent the remedy to us appears worse than the disease.

Concerning Gas.—The gas companies of New York city and its dependencies, ten in number, have an aggregate storage of over ten million cubic feet, in forty gasholders, working between three and four thousand retorts; turning out 2,500,000,000 cubic feet of gas per annum, and collecting over $8,000,000 form consumers. The London gas companies number thirteen, and last year supplied that city with the enormous amount of 8,653,000,000 cubic feet. The "Parisian company for lighting and heating by Gas" lights the whole of Paris, the great part of the townships of the Department of the Seine and some of those *Seine-et-Oise*. The company have ten gas works fifty gasometers, and in 1866 distributed 1,360,000,000 cubic feet. London consumes on an average 936 feet per head of the whole population. Paris furnishes on an average 740 cubic feet for each inhabitant.

Speculation Run Mad.—We noticed some time since, as the latest sensation, a plan for tunneling the bed of the Atlantic and establishing railway connection between the Old and New World. But even this insane idea is surpassed in its absurdity by a project which we find published in *The Circular* advanced by a New York visionary, to construct a causeway from continent to continent, the navies of the world combining to transport the unnecessary mountains of the continents to a surveyed definite locality in the Atlantic. When completed the half-mile width of surface grade would be sufficient for rail and common roads and would also furnish desirable building lots. He believes this to be the time when faith as a grain of mustard seed shall say unto the mountains "Be ye plucked up and cast into the sea," and be literally obeyed; and urges for the project free public discussion, and the presentation of plans and proposals.

A New Explosive.—A cheap gunpowder in which charcoal is replaced by common glue is thus prepared by M. Pool. The glue or gelatin is first soaked in cold water and then heated in diluted nitric acid until it dissolves. It is next evaporated to dryness, re-dissolved in hot water, and then carbonate of baryta is added to neutralize the acid. The solution is again evaporated, one part of sulphur and six parts of nitrate of potash for every two parts of glue being incorporated as the evaporation proceeds. This gives a slow burning powder which may be rendered more energetic by replacing nitrate by chlorate of potash.

A Gigantic Casting.—Messrs. Rowan & Sons, York street, Belfast, lately made a successful casting of a fly wheel 24 feet in diameter, weighing upward of 18½ tuns, and one of the most ponderous articles that have been produced in that country. The rapidity with which the whole work was done was surprising, seventeen tuns of metal being melted in the space of two hours. The work was effected by means of three ladles, containing respectively eight, six. and three tuns, which were raised by a crane, and guided by a number of the men. So closely were the calculations made that the surplus metal only weighed a few pounds.

Improvement of the Mariner's Compass.—Unless the compass card maintains its position, serious errors may be committed in steering the vessel; and, as ordinarily arranged, it is liable to be seriously affected when the ship at once rolls and pitches, notwithstanding the care taken, by means of gimballs, to render it independent of the vessel's movements. The Earl of Caithness has patented a contrivance in which is employed a ball-and socket joint, and a pendulum weight, the card being by this means maintained in its position however violent or varied may be the motion of the ship.

A California Century (?) Plant.—In a private garden in Santa Barbara, there is a most beautiful specimen of the *Agave Americana* in full blown. The immense circle formed by the great leaves is nearly twenty-two feet in diameter, and the beautiful tapering green column bursting out of the heart of the plant reached the hight of nearly forty feet on the last week of July, the base measuring eight inches in diameter. This plant was grown from a rootling planted in 1857, and now of course is ten years old, a decennial more properly than a century plant.

Prof. Czermak, in the University of Jena has found in the stomach of an Egyptian mummy, a roll of something which proved to be the skin of the sole of the mummy's own feet. Investigation has shown that this was a common practice among the ancient Egyptians, and is explained as symbolic of the eternal separation of the dead from the earth he so long trod, and as a sign of his manumission from the thrall of the world.

An Egg of an Extinct Bird.—M. Grandidier has presented to the French Academy an egg of the remarkable extinct bird, the Epiornis, of Madagascar. Having lately returned from the island, he says the eggs of Epiornis are found on a plain at one side of the island, and at a hight of several metres above the sea level. Strange that though numerous eggs have been discovered, the bones of this creature are rarely found. From what M. Grandidier has learned from the natives there seems little doubt that the Epiornis is extinct.

Cement for Coal-dust Fuel.—One of the best cements for the agglomeration of coal dust fuel is said to be that used in several Continental establishments, consisting of coal tar, gluten and starch. The quantities of these substances are altered according to the quality and properties of the coal dust; but they are very easily ascertained by a few experiments. About 2 per cent of this mixture (say, containing 2½ parts of coal tar, 1 part of gluten, and ½ part of starch) would be suitable for coal dust of an average quality of bituminous coal.

A Walking Leaf.—In parts of the East Indies there is found an insect, the phylluim, or walking leaf, in which not only are the wings perfect imitations of leaves in every detail, but the thorax and legs are flat, dilated and leaf-like; so that when the living insect is resting among the foliage on which it feeds, the closest observation is often unable to distinguish between the animal and the vegetable.

At a recent sitting of the French Academy of Sciences a paper was received from M. Ch. Musset, in which, referring to the irregularities observable in the concentric zones of the trunks of trees, all of which he finds to be elliptical with a major axis perceptibly directed east and west, he considers it highly probable that this shape is owing to the earth's rotation round its axis.

Balancing Accounts.—The receipts of the Paris Exposition from the day of its opening, April 1st, to September 10th were $1,500,000. A further sum of $300,000 will be required to cover expenses, and this amount is expected to be forthcoming during the seven weeks that remained.

The gold eagle weighs 254⅘ grains; of these $12\frac{9}{10}$ grains are silver, and $12\frac{9}{10}$ are copper. The silver and copper are each one eighteenth of the gold; the silver and copper together are one ninth of the gold.

The famous spring on the Gettysburg battle field contains lithia, a substance which is contained in small fractional proportions in the mineral springs of Germany, and in those of Vichy in France.

The latest authority estimates the population of the world at 1,250,000 000.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

A Lowell manufacturer has made and sold over 30,000 pairs of ball shoes this year. They are made with canvas uppers and stout soles, and are intended more for use than ornament.

The Secretary of State has been informed of the discovery in Alaska of a seam of pure anthracite coal over thirty feet deep, which has been traced for a mile near a good harbor.

The Dubuque (Iowa) *Times* says: "We have here an unexplored mining field nearly seventy miles square, which has been merely scratched on the surface at a few points, and over $50,000,000 value of lead has been raised. The wonder is that our lead region does not attract greater attention from the mining adventurer.

Opals, rubies and other precious stones have been lately found in California. The varieties of costly rubies thus far discovered are the pure white, and the semi-transparent with blue reflections; the transparent yellow, and lastly and most valuable, the green variety.

The lumber production of Maine this year is estimated at 666,000,000 feet.

The Pacific oil-works recently started in San Francisco, manufacture oil of mustard seed, which can be applied to a variety of purposes, as oiling wood, lubricating machinery, and the manufacture of soap. Other vegetable oils will soon be made at these works, and a very extensive and valuable branch of manufacturing industry is opened in California. The *American Exchange* says: With her oil, her corn, her wine, her precious metals, and almost all other things which she can readily add thereto, what may not be the future of California?

Five lines of railway from the East are to make Omaha their terminus, and four others will tap the Pacific Railroad within 150 miles of that point.

The French house of Petin, Gaudet & Co., which has obtained distinction in connection with the manufacture of steel, possesses six establishments in different departments, employs 5,200 men, and has, besides, steam engines of an aggregate force of 6,000 horse-power. It produces annually 50,000 tuns of iron and steel.

It is estimated that over one million gallons of oil and turpentine are packed in tin cans in this city every month, for shipment and home consumption.

A correspondent takes us to task for publishing an item asserting that the oldest locomotive in America was built in Maine in 1835, and states the Baltimore and Ohio road went into operation in 1830; the Albany and Troy in 1831; the New York and Harlem in 1832; the Camden and Amboy, the Boston and Providence and the Lexington and Ohio, opening in the next two years, and it is hardly to be supposed that all these roads operated without locomotives. Away down in Maine the first line was opened in 1838.

Lawrence, Mass., with her twelve gigantic corporations whose capital stock amounts to $14,000,000 which employ 14,000 hands, run 439,188 spindles and 12,161 looms, and produce weekly 2,220,000 yards of cotton goods, 35,000 of woolen35,000 of carpets, is rightly named the "city of spindles."

The ironworks of Creuzot, whose works are described in our last issue have obtained a contract to provide 80 locomotives for Russia.

California has another new sensation, in the immense deposit of magnetic ore in Sierra and Plumas counties, which are pronounced the most remarkable of any heretofore discovered in any country. Two million tuns are superficially scattered over a surface three miles in length. This deposit is within ten or twelve miles of the Union Pacific railroad.

In concluding a paper on cotton spinning machinery read before the Institution of Mechanical Engineers at Birmingham, Mr. Platt stated that the number of spindles now employed in the cotton manufacture in Great Britain exceeds 36,000,000. The produce of yarn when in regular work is 64,000,000 miles in a day of ten hours, which gives enough to wind four times around the globe every minute.

The St. Louis and Iron mountain railway is under contract for an extension to connect with the Mobile and Ohio road, at Columbus, Ky. The line passes through the great iron, and lately discovered tin regions, and by adopting the same gage of track, a line of transit will be open at all seasons for the vast commerce of the Mississippi valley.

The number of locomotives on German railroads in 1864, was 4,768, of which 574 were manufactured abroad; but now Germany not only builds her own locomotives, but sent one thousand last year to other countries, such as Switzerland, Italy, France and Russia. The number of engines now used on the railways of Germany is 5,250,340, of which have to be replaced every year. The largest of the German factories is that of Borsig, of Berlin, which has built two thousand railway engines since it was first established in 1841. Of the others, the principal are that of Maffei in Bavaria, that of the Austrian railway companies at Vienna, Egerstorff's at Hanover, and Henschl's at Cassel.

Recent American and Foreign Patents.

Under this heading we sh ll publish weekly notes of some of the more prominent home and foreign p tents.

Animal Trap.—Samuel Pence, Eaton, Ohio.—This invention has for its object to furnish an improved animal trap of that class in which each animal as it is caught sets the trap for the succeeding one.

Pump.—Martin S. Coller, Milwaukee, Wis.—This invention has for its object to so construct and arrange a pump in connection with a railroad track that the passage of a train of cars will raise the water into a reservoir.

Sawing Machine.—Joseph M. Batchelor, Foxcroft, Maine.—This invention has for its object to furnish an improved sawing machine simple in construction, easily operated, which will do its work rapidly, and will not be liable to get out of order.

Truss.—W. J. Johnson, New Orleans, La.—This invention while it is pressed upward, the elastic band or belt by which it is attached or secured to the person, it is always kept pressed closely to the person, it being impossible for it to get away from the upward pressure under any circumstances.

Lathes.—Benj. M. Levy, Montgomery, Ala.—This invention relates to lathes more particularly for watchmakers use.

Obstetrical Bandage.—Joseph O. Hamilton, Jerseyville, Ill.—This invention is so made or constructed as to fit persons of varying sizes or dimentions, and when worn be perfectly comfortable and easy.

Lock.—Henry Bosch, Mount Vernon, N. Y.—This invention consists in constructing a device by which the bolt of a lock can be locked fast, from the inside where the bolt is locked and which can also be locked fast when the bolt is unlocked thus forming a perfect night latch.

Chimney Cap.—James Hammond, Adams Center, N. Y.—This invention relates to a cap for chimneys which is so constructed as to act as a preserver of chimneys, in completely preventing the rain from entering the top, while at the same time a proper and sufficient draft is obtained or admissible.

Hay Loading Device.—C. H. Gifford, Philadelphia, N. Y.—This invention has for its object to furnish an improved apparatus by means of wnich a hay fork may be easily and conveniently operated for loading hay.

Hose Coupling.—L. J. Roberts, Corry, Pa.—This invention has for its object to furnish an improved hose coupling so constructed and arranged that it may be quickly coupled and uncoupled and in which the screw threads will be guarded from being bruised or injured.

Stretching Machine.—J. F. Coburn, Newark, N. J.—This invention relates to a new machine for stretching hides of all kinds and consists in so combining a sliding with a stationary frame by means of toggle-levers that by moving the said levers a hide tacked to both frames will be thoroughly stretched both in a horizontal and vertical direction.

Skate .—John Forbes, New York City.—The object of this invention is to so construct and connect the different portions, plates etc. of a skate that the same can be easily taken apart for cleaning and other purposes. The invention consists in forming the drops for securing the foot rest on the same by punching and bending. It also consists in arranging the button by which the foot rest is attached to the runner, T-shaped or in providing the same with slotted heads, so that by running them one quarter round they can be taken off.

Cultivator or Harrow Tooth.—H. F. Paul, Concord, N. H.—This invention relates to a new manner of shaping the flaring wings of cultivator or harrow teeth and consists in arranging the upper end of the wings open at the rear of the main part of the tooth so that the surface soil will fall to the bottom between the teeth and will thereby also cover the track of the tooth leaving no furrow. The invention also consistis in making the said wings removable so that they can be replaced whenever desired and when worn out.

Churn.—A. H. Brown. Springfield, Vt.—This invention consists in the peculiar formation of the dasher and bottom portion of the churn vessel, and also the method in which the motion given by the gearing is changed from fast to slow and *vice versa*.

Governor.—Eli L. McNett, Canton, Pa.—This invention relates to a new and improved method of constructing governors for regulating the motion of steam engines and for other purposes.

Gage Cock.—John G. Raymond, Rondout, N. Y.—The object of this invention is the construction of a gage cock (for ascertaining the hight of water in steam boilers.

Cutting Bar.—M. J. Mellyn, Roxbury, Mass.—This invention relates to a new and improved device for cutting off the projecting ends of bolts which are used for fastening tires on to wagon wheels.

Tallying Instrument—George Farmer, Flint, Mich.—This invention consists in a combination of wheels with figures stamped thereon which are revolved and operated in combination with a dial plate.

Loom for Weaving Tape and Ribbons.—John Rushworth, New York City.—This invention relates to a new and improved method of constructing the rack by which the shuttle is moved in tape and ribbon looms and for all looms in which goods of a similar nature are woven.

Gate.—S. M. Denniston, Hudson, Wis.—This invention has for its object to furnish an improved gate, so constructed and arranged as to be operated by the wheels of the advancing carriage, and which is closed by the same means as the carriage, after passing through the gateway, passes off the platform.

Hay Fork.—C. H. Giffard, Philadelphia, N. Y.—This invention has for its object to furnish an improved fork for loading or unloading hay, which shall be simple in construction, easily operated, strong, and durable.

Butter Cutter.—A. N. Merritt, Gardner, Mass.—This invention has for its object to furnish an improved implement by means of which butter may be cut from the crock or tub in a suitable form and size for the table.

Sled Brake.—H. W. Smith, Rainsburg, Pa., and B. C. Smith, Tolleston Ind.—This invention has for its object to furnish an improved sled brake, simple in construction, effective in operation, and which will give to allow it to pass over obstructions.

Washing Machine.—Samuel R. Holmes, Salem, Oregon.—This invention has for its object to furnish an improved washing machine by means of which the clothes may be easily, quickly, and thoroughly washed, which will not wear or tear the clothes, and which may be operated with a small outlay of power.

Wagon Bed Brace and Fender.—James E. Strode, Carrollton, Ill.—This invention has for its object to furnish a protection to the bottom and sides of the wagon bed, and also a stay to hold the bed to its place.

Churn.—M. M. Brown, Pimento, Ind.—This invention has for its object to furnish an improved means by which motion may be communicated to a churn dasher, and to other machines.

Cradle Rocker.—Patrick Power, Chicago, Ill.—This invention has for its object to furnish an improved rocker, by means of which the cradle or other article to which it is attached may be easily movable from place to pl

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SEWING MACHINE.—E. Hodgkins, Marlboro, N. H.—This invention relates to certain new and useful improvements in single thread sewing machines, and it consists in a novel feed mechanism, an improved means for giving a proper degree of tension to the thread, and an improvement in the needle plate, whereby an improved sewing machine of the class specified is obtained.

HORSE RAKE.—Frank Holden, Litchfield, Ill.—This invention relates to a new and improved revolving horse rake, and it consists in a novel construction of the same, and a peculiar arrangement of parts, whereby several advantages are obtained.

SMUT MACHINE.—W. W. Connor, Nobleville, Ind.—This invention relates to a new and improved machine for scouring smut and other impurities from grain, and separating the former from the latter.

HARVESTER.—James M. Kellar, and Martin L. Kellar, Buckeye, Iowa.—This invention relates to a new and improved harvester, of that class provided with a horizontal rotary cutting wheel, and it consists in a peculiar construction and arrangement of parts, whereby several advantages are obtained.

BRICK MACHINE.—A. La Tourrette, Waterloo, and Seth H. Smith, Venice' N. Y.—The object of this invention is to obtain a simple and cheap machine for pressing and molding bricks, one which may be operated by a very moderate expenditure of power, and still perform its work expeditiously and in a superior manner.

METAL TIP FOR SUSPENDING BROOMS, MOPS, AND OTHER ARTICLES.—M. C. HAWKINS, Edenboro, Pa.—This invention relates to a new and improved metal tip for suspending brooms, mops, and other articles for household use, which are provided with wooden handles. The invention consists in striking up out of a single piece of metal or casting a ferrule which is driven on the end of the handle, and received by a rivet or provided with an internal screw to screw on the handle, the outer end of the ferrule being in the form of a loop to catch over nail or hook driven in the wall.

MOLD FOR CASTING ALUMINUM PLATES FOR ARTIFICIAL TEETH.—James B. Bean, Baltimore, Md.—In this invention the contractibility of the aluminum used for casting the plates is compensated by the expansibility of the molds in which the plates are cast, a new composition being used for that purpose

WATER GAGE.—James C. Walker, Waco Village, Texas.—In this invention several tubes pass through the boiler, some under and some above the water, through which currents of air are induced by the heat of the water or steam surrounding them. These currents are made to sound musical notes, and thus indicate the condition of the steam and water in the boiler.

CULTIVATOR.—S. D. Tuttle, and John H. Gans, Eaton, Ohio.—This invention relates to a new and improved device for cultivating corn, cotton, and other crops, which are grown in hills or drills. The invention consists in a novel construction and arrangement of parts, whereby a very desirable implement for the purpose specified is obtained.

MOP WRINGER.—Duane Peck, Rochelle, Ill.—This invention relates to a new and improved device for expressing moisture from mops, while using the same, and it consists in the employment or use of pressure rollers in connection with a treadle, all arranged in such a manner as to admit of the mop being readily adjusted between the rollers, and operated upon by them so as to effectually express the moisture therefrom.

DEVICE FOR EXTRACTING STUMPS, LIFTING STONE, ETC.—G. W. Pressey, Hammonton, N. J.—This invention relates to a new and improved device for extracting stumps, and lifting stones and other heavy bodies. The invention consists in a novel arrangement of pawls with hand levers, and a lifting bar, whereby a very simple, powerful, and efficient lifting device is obtained. The invention also consists in an improved hook or fastening for connecting the lifting bar with the article to be raised.

DEVICE FOR PACKING COTTON.—H. D. Stover and J. W. Hutchison, N. Y. city.—This invention relates to a new and useful improvement in packing cotton, and is designed to supersede the ordinary baling process. The invention consists in compressing or packing the cotton into wooden barrels, whereby several advantages are obtained over the present mode of compressing and baling.

METHOD OF SECURING ARTIFICIAL TEETH TO CAST PLATES.—James B. Bean, Baltimore, Md.—In this invention a plate of aluminum or other similar metal is employed, having recesses into which the teeth are fitted. A groove is left beind the teeth, between them and the plate, into which pins attached to the teeth project, which is afterward filled with tin under pressure, the teeth being thus firmly secured to the plate.

CAR COUPLING.—Freeman Moore and John A. Baker, Carrollton, Ohio.—This coupling consists of a hinged latch, which is arranged within the throat of the draw head, and connected to a forked lever which is acted upon by a spring, and pivoted in such a manner as to adapt the link or shackle to be automatically coupled when the cars come together, or to be instantaneously uncoupled in the event of one of the trucks running off the track. Provision is also made for operating the latch by means of a lever, so that the link can be uncoupled by a person standing upon the platform, the desired end being thus accomplished without exposing the body or limbs to danger.

DITCHING MACHINE.—A. La Tourrette, Waterloo, N. Y.—This invention relates to a new and improved machine for making ditches, and it consists of a novel arrangement of an endless chain of spades or scrapers, whereby the latter may be adjusted to excavate the earth at a greater or less depth, as may be desired, the machine rendered capable of extricating itself with the greatest facility in case of the spades or scrapers meeting with an obstruction, and also allowed to travel and work in a curved path, in cases where a curved ditch is required.

SELF-ACTING PLOW HANDLE.—John L. Keasor, Laconia, N. H.—This invention has for its object to furnish an improved means by which a plow or plows may be connected to a wagon so as to be held and operated automatically.

BRUSH CLAMP.—Arthur Huston, Bristol, Me.—This invention has for its object to furnish an improved brush clamp so constructed and arranged as to be easily attached and detached, which will give the brush a flat or fan shape, which will prevent the brush from becoming worn pointed, and which will render it unnecessary to wind a new brush as is now necessary.

THIMBLE SKEINS FOR AXLES.—John A. Williams, Elizabeth, Ill.—This invention relates to an improved thimble skein for axles, and consists in turning the socket on the belt end of the skein, and connecting the skeins by a rod having a right and left-hand thread furnishing a substantial brace to the axle. The thimble is also open at the extremities and the belt end of the skein and connecting rod are adjusted to the under side of the axle.

MECHANICAL MOVEMENT.—C. D. Snell and J. W. Penny, Mechanic Falls, Me.—This improvement relates to a mechanical movement, and consists of a device for running shafting at any angle without the use of bevel gearing.

HORSE COLLAR.—T. J. Shipley and W. A. Moody, Montezuma, Iowa.—This invention relates to an improvement in horse collars, and consists in a rubber spring adjusted in a hollow pad or shoe and attached to the sides of the collar, which is disconnected at the bottom by hooks secured into the walls of the collar.

COMBINED CRANK, FRICTION WHEEL, AND BRAKE.—R. M. Van Sickler, New York city.—This invention has for its special object to improve the construction of the improved portable elevator, patented by the same inventor Feb. 12, 1867, but it is equally applicable wherever a crank and brake are used.

WASHING MACHINE.—John Vail, Yankee Jim's, Cal.—This invention has for its object to furnish a simple and convenient machine for washing clothes, which shall be easily operated and will do its work quickly and thoroughly.

BALING PRESS.—Thomas D. Guthrie, Galva, Ill.—This invention has for its object to furnish an improved press, designed especially for baling broom corn, but equally applicable for baling other substances, which shall be simple in construction, easily operated, and efficient in operation.

HORSE POWER.—Thomas Wiltse, Jr., Panama, N. Y.—This invention has for its object to furnish an improved horse power, designed especially for operating a drag saw, but equally applicable for other uses, and which shall be simple in construction, durable, and effective in operation.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at 50 cents a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

F. C., of La., asks, "Will a common butterfly valve regulate the engine better by being placed near the steam chest than if it is placed say eight feet from the chest?" The speed will be regulated more uniformly with the valve near the ports.

E. H., of Mo., says: "I hope you will favor your subscribers with a list of articles of manufacture, machinery, etc., for which prizes have been awarded at the Paris Exposition. Will you be kind enough to state in your column of answers to correspondents to whom premiums were awarded for artificial stone, provided the information is at your command." We regret that no report other than that first sent by the cable has ever been published; soon as it is we shall give it to our readers. There seems to be some mismanagement in this matter.

J. C. J., of Va., complains that there is an oxide of iron in the water from which he evaporates his salt which gives the salt a reddish brown color. He desires a remedy, and we think a small quantity of lime water will precipitate the iron from the brine.

C. N. M., of Pa., desires information relative to a treatise on arithmetic suitable for beginners. We can recommend nothing better than Greenleaf's Arithmetic.

H. L. W., of Pa., asks for a "reliable rule for finding the horse-power of a steam boiler, applicable to the different modes of location, fire surface, etc. Steam pumps are being generally introduced in this region to which the steam must sometimes be carried a long distance. How much waste is there in carrying steam 1,000 feet?" The rule for calculating the horse-power of a boiler varies somewhat with its construction. It is safe, however, to allow fifteen square feet of fire surface to the horse-power, and six square inches of grate surface. If your steam pipes are of ample area, and well covered with felt or other good non-conducting material you will suffer but little perceptible loss from condensation in carrying steam through 1,000 feet of pipe.

E. N. C., of N. H., asks if there is any "cheap material of which flues can be constructed which will withstand intense heat without continually burning out. They would be kept at a red heat. Iron will not stand." There is nothing we know of better than fire brick or fire clay.

R. W. M., of N. H.—"How can boilers which have begun to rust be prevented from further rusting?" If the rust is on the outside, coat it with asphaltum dissolved in spirits of turpentine. For inside rusting we know of no certain remedy.

G. T. W., of Miss., asks for a process of making wine from the "sour orange." We are not acquainted with the qualities of that fruit, but probably no process very different from that employed in the grape wine manufacture would be necessary. A few experiments could determine the matter.

G. J., of Me.—"What effect does frost have on cold short iron and on red short iron; and are these qualities most brittle when expanded by heat or when contracted by cold?" Cold short iron when hot is tough, but when cold, brittle. Directly the reverse is true of red short iron. Railroad bars composed of these two differing irons would, we think, be quite unreliable.

J. M., of Conn., asks if it requires the "same degree of heat to melt copper when largely alloyed as when pure." Alloys of copper, zinc, and tin and all other similar alloys require less heat to fuse them than copper.

S. S. E., of Ky.—By addressing Mr. John A. Roebling at Trenton, N. J., you can undoubtedly get a copy of his report on the East River Bridge. It has been published.

J. E. B., of Ohio, asks us which of two air guns will be most effective, one with the air cylinder tapering toward the barrel containing the ball, or one the end of the cylinder of which is square; a piston in the air cylinder compressing the air. He sends diagrams illustrating the two forms. We reply that the static pressure would be the same in both cases, but if, as appears, the question is which form is best adapted to the delivery of a certain amount of air in a certain time the funnel-shaped end of cylinder is preferable.

J. P. J., of Pa.—The "bogie" of the English locomotive engineers is simply and only the four-wheeled truck in use in this country for supporting the forward end of the locomotive. It was invented by John B. Jervis, C. E., author of a treatise on railways, in 1831. Wm. Mason, of Taunton improved the truck by spreading the two axles sufficiently to allow the cylinders (outside) to stand on a level with the center of the driving wheels.

J. D. R., of N. Y.—"What rule is there for approximating the number of revolutions engines are intended to make, while designing them, so as to calculate the horse-power?" "What advantage is there in a double threaded screw?" The number of revolutions determined on in the designing of steam engines is governed by the use to which the engine is to be put, the space and weight, etc., allowed. Those engines which give the best results have a speed of piston of from 350 to 450 feet per minute. Correct data to work from in designing engines can be furnished by a first-class consulting engineer. As to double threaded screws their use is to give a fast thread without cutting away too much of the cylinder on which they are formed. We have seen not only double, but triple, quadruple and quintuple screws cut, where rapid longitudinal motion was required with a comparatively slow rotary motion. While the single thread would be wide apart and quick, the double or triple thread would be close, looking like a fine thread, yet equally as fast.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Parties having a Paper Mill for sale or lease will please address, with particulars, Wm. H. Gandey, Lambertville, N. J.

Capitalists, seeking investments, are invited to investigate the merits of "Cotton Tie," illustrated in present number.

Wanted, manufacturers for the best double-shovel (iron) plow in the market. Address Ray & Shalters, Alliance, Ohio.

One of the patented articles included in the property offered for sale by J. I. D. Bristol, in another column, is a combined tea and water urn, which has been tested by one of the editors of this paper, with satisfaction. The dies and other appropriate tools for making the article are offered for sale, with the patent, and would afford a good business.

Send Circulars of the best Oat extracting or separating machines and Paper Sack Flour Packing Machines in the world to W. Hill Box 13, Marshall Town, Marshall Co., Iowa.

Two Valuable Patents for sale or a partner wanted to manufacture. Address E. Fitzki, Quartermaster Genl's Office, Washington, D. C

Wanted to Buy—a cheap Hand or small Horse-power Spinning Machine, for various kinds of fibers, to work a number of spindles. Also, cheap hand or horse-power machinery for preparing the fiber for it. Also, one for making twine or cord. Address P. O. Box 202, Yonkers, N. Y.

Monopoly in pivoted Connecting Links—Four Patents—the last just being issued. Open for manufacturing on royalty, or for sale. Address K. & C., care Holske Machine Co., 528 Water st., New York.

Eureka Cultivator (see illustration page 88), for corn or cotton, the greatest labor-saving production of the age. Capitalists, Planters, and patent right dealers investigate the best selling patent of the times. Pamphlets furnished. Address Omar Arnold, Mount Ida, Wisconsin,

Manufacturers of Improved Rat and Mouse Traps, Butchers' Scales, or other Hardware and Tools will send lists (prepaid) to Ryan & Oliver, Toronto, Canada.

Artesian and Petroleum Wells.—The great Earth Boring Machine with which a hole, from nine inches to three feet in diameter, can can be sunk to a depth of 3,000 feet, through sold rock, can now be seen at 222 Pearl street, New York city.

NEW PUBLICATIONS.

GOD'S GLORY IN THE HEAVENS.

A very interesting and curious work on astronomy from the pen of Wm. Leitch, D. D., has just been issued by the publishing house of Alexander Strahan, London. The work is copiously illustrated, and the writer's object seems to be to harmonize the arguments of theologians with the discoveries of Astronomers. The work presents a survey of recent astronomical discoveries and speculations, in connection with the religious questions to which they give rise. George Routledge & Son, 416 Broome street, New York.

PROGRESS OF THE WORKING CLASSES.

Statistics and interesting statements of the condition, habits, and sentiments of the working classes of London, from 1831 to 1867. Strahan, publisher. For sale by George Routledge & Son, 416 Broome street, New York.

HAND BOOK ON COTTON MANUFACTURES.

A work on the practical art of manufacturing has been much needed. From a cursory examination of a new hand book before us, and from the reputation of the author, we think every cotton manufacturer, manager, overseer, or operative will be benefited by having a copy for reference. It contains rules and examples for finding the speed and dimensions of all the wheels, pulleys, rollers, etc., necessary to produce any desired result in each and every operation in a cotton mill; rules for finding all the necessary drafts, twist, doublings, and allowance for loss in working, to produce any given number of yarn, etc., etc. The latest and most approved machinery and some of the largest and handsomest cotton factories in the country are illustrated by engravings. James Geldard, the author, has had some thirty years practical experience in cotton manufacturing. John Wiley & Son, 535 Broadway, New York, publishers.

POST ROUTE MAP.

We are indebted to George W. McLellan, Second Assistant Postmaster General, for a copy of a splendid postal map of the New England States. Those of New York and the Middle Atlantic States are in progress and will shortly appear. Besides the distribution to postmasters for the service of the Department, these maps are on sale to the general public, and may be procured at the Post-office Department (Second Assistant Postmaster General), or from the sole agents in Philadelphia, New York (D. Van Nostrand), Boston, and Portland.

POPE'S ESSAY ON MAN.

A new and finely illustrated edition (15 engravings) of Pope's Essay has just been issued from the press of S. R. Wells, 389 Broadway, New York. Whatever may be said by theologians concerning the orthodoxy of this great poet's religious views, his Essay on Man will continue to be regarded one of the masterpieces of English verse, and will attract the attention of, and instruct the intelligent and thoughtful. Price, bound $1; paper covers, 50c.

THE ELEMENTS OF EUCLID AND LEGENDRE, with Elements of Plane and Spherical Trigonometry. By Lawrence A. Benson.

The author of this treatise has prepared and published a text book adapted for the use of schools and colleges, the plan of which being the reducing of geometrical science to the smallest compass, such proportions are only introduced in it as are required to substantiate the principal theorems by which the principles of geometry have practical applications in Trigonometry, surveying, mechanics, engineering, navigation, and astronomy. A new and important feature of this work is the establishment of all geometrical propositions by the direct method of reasoning, dispensing entirely with the *reductio ad absurdum* or indirect demonstration, the author's argument being that every true proposition must be susceptible of proof without any such circuitous process as that heretofore employed for demonstrating certain propositions. The work before us bears the commendation of President Webster and Prof. Docharty, of the College of the City of New York; Prof. J. G. Fox, principal of the Cooper Union Free Schools; also the superintendent of the Board of Education of this city, and has been entered on the list of text books for the ward schools of this city.

THE HISTORICAL MAGAZINE, and Notes and Queries concerning the Antiquities, History, and Biography of America. Edited by Harry B. Dawson, Morrisania, N. Y.

The last number of this periodical is at hand, containing the usual amount of curious and interesting matter. The magazine is under the editorial management of Mr. Dawson, who has had long previous service in the field of American antiquities. It is handsomely gotten up, and serves as a repository for the preservation of valuable historical matter which without it would be irrecoverably lost. We commend the work to the notice of the curious antiquarians and historical students.

A TREATISE ON THE SCREW PROPELLER. By John Bourne, C. E. London. D. Van Nostrand, 192 Broadway.

We have received the closing number—XXIV.—of this highly valuable treatise. Mr. Bourne has done a notable service to marine engineers in the preparation of this series. The illustrations, particularly those of engines, are excellent, and will prove of much service to all interested in the construction of screw engines; and the text is written plainly, forcibly, and lucidly.

THE SPORTSMAN AND NATURALIST IN CANANDA.

Messrs. Hunt & Blackett, 13 Great Marlborough street, London, have recently published in most elegant style the natural history of the game, game birds, and fish, which abound in Canada. The work is copiously illustrated with beautiful colored engravings of game, and the different kinds of fish which abound in the forests of Canada. The author, Major W. Ross King, says, in the preface: "During a sojourn in these regions, extending over a period of three years, constantly rod in hand or roaming the woods with dog and gun, I habitually recorded in my note-book memoranda on the haunts and habits of the birds and animals which I have endeavored to describe in the succeeding pages; and I can only hope that my jottings may be useful to those who read them, with the view of themselves enjoying the same results, and interesting to those who would recall similar bygone days of agreeable recreation." Geo. Routledge & Son, 416 Broome street, New York, have the work for sale.

EXTENSION NOTICES.

William Wright, of New York City, having petitioned for the extension of a patent granted to him the 13th day of January, 1854, for an improvement in operating cut off valves of steam engines, for seven years from the expiration of said patent, which takes place on the 3d day of January, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of December next.

John Donlevy, of New York City, having petitioned for the extension of a patent granted to him the 3d day of January, 1854, for an improvement in method of forming plates for polychromatic printing, for seven years from the expiration of said patent, which takes place on the 3d day of January, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of December next.

Edward A. Tuttle, of Brooklyn, N. Y., having petitioned for the extension of a patent granted to him the 3d day of January, 1854, for an improvement in hot air register, for seven years from the expiration of said patent, which takes place on the 3d day of January, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of December next.

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Improved Rotary Pump.

To no mechanical contrivance, perhaps, has so much inventive genius been applied as to the means of lifting and forcing liquids. The availability of the many, almost numberless, machines that have been devised to effect this object, depends upon the principle of the amount of, and rapidity with which a vacuum can be produced with the least expenditure of power. For the varied uses to which this contrivance is applied, this object is most readily obtained by the rotary pump. The accompanying engravings represent a very neat and compact pump.

Fig. 1 shows a perspective view of the pump, as placed when driven by power.

Fig. 2 is a perspective view with cover or head removed, showing the interior mechanical arrangement.

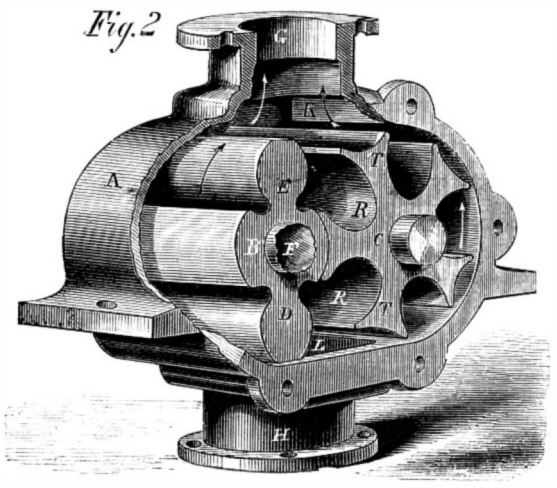
Fig. 3 is a perspective view of the cover or head of the pump, showing the position and comparative size of the recess, a similar recess being upon the corresponding opposite interior side.

Fig. 4 represents a hand pump, as placed in a well for general use.

A is a pump case through which the liquid is to be lifted and forced. Within said pump case are two hubs, each having flanges or pistons of a peculiar shape. These hubs are denoted by the letters, B and C. The pistons on the former are denoted by the letters, D and E, and on the latter by the letters, T T, having recesses, R R, between the pistons respectively.

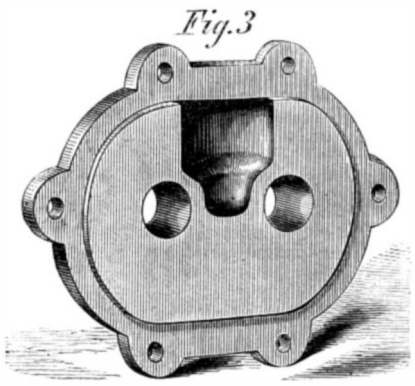
The hub, B, Fig. 2, is moved by the application of power to the driving shaft, which is seen broken off at F, Fig. 2.

Fig. 2



The pistons or flanges, D and E, on the hub, B, are so constructed and arranged that when describing their outer semi-revolutions, the external surface of each respectively moves in close contiguity with the interior semicircular surface of that portion of the exterior case of the pump, and in making their inner semi-revolution they work in contact from point to point throughout their entire extent with the surfaces of the concave recesses, R R, the whole being so constructed and arranged that the convex surface of the one shall impinge upon and press directly against the concave surface of the other from point to point in regular continuity, so as to press out from between the two surfaces all the liquid, and cause it to flow toward the eduction pipe, G, of the pump.

Fig. 3



In like manner the pistons, T T, on the hub, C, throughout their entire semi-revolutions, move in close contiguity with the interior semicircular surface of the external case of the pump, so that the liquid cannot flow backward, past these pistons, toward the induction pipe, H.

In this manner all the liquid which is pressed into the recesses, R R, and the small concavities at the outer extremities of the pistons, T T, of the hub, C, as well as all the liquid which is cut off at each semi-revolution of the hub, B, by the flanges or pistons, D, E, respectively, is carried forward toward the discharge pipe, G, and cannot return toward the induction pipe, H.

In order that the machinery should work without strain, there is provided a recess, K, on the inner side of the cover or head, and a like recess on the opposite interior flat surface of the pump case which is swept by these hubs and pistons. Both these recesses open upward, toward the discharge pipe, G, so that the piston, E, Fig. 2, when passing into the corresponding recess, R, may force the liquid in such recess, R, into the recess, K, of the cover or head, and a corresponding recess, K, on the opposite interior flat surface of the pump case, and thus relieve the machine from all strain resulting from the compression of the liquid, and enable it to flow readily and freely from the recesses, R R, as the pistons, D and E, enter them. As a further relief from strain, this pump is provided with two square chambers, L L, of a corresponding length with the hubs and pistons, thus allowing the liquid to enter and discharge freely.

From the construction of the hubs, B and C, and their pistons, it will be seen that the motion of the hub, C, is not constant, but intermittent, being at rest from the time the neck of the piston, D, leaves the external edge of the piston, T, upon one side, until the neck of the piston, E, strikes the edge of the same piston, T, on the opposite side.

By giving the hub, C, an intermittent motion, the driving hub, B, is made with but two pistons, of such size and shape as to give greater strength, more space for water within the pump case, and consequently a greater flow of water from the pump when in operation than could be done if the hubs had each the same number of similarly shaped pistons, and should be kept in constant motion, or move simultaneously with each other.

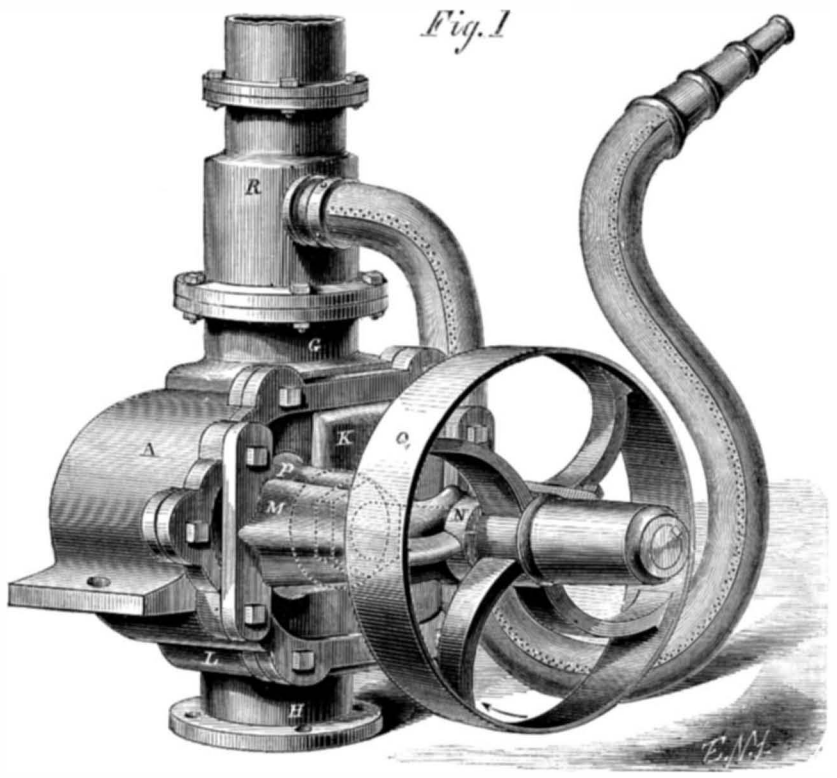
By this construction and motion of hubs and pistons, the objection that obtains against many, if not all, the rotary pumps in use, namely, the great amount of friction when working under a pressure, is overcome; for, when the pistons, D and E, of the propelling hub, B, are sustaining the resistance of the liquid, the pistons, T T, of the hub, C, opposite each other, are equally acted upon by the liquid, leaving the hub, C, with its pistons, in a state of equilibrium; consequently but a small amount of force is required to move the hub, C, and but little friction or wear will result even when working the pump under a heavy pressure.

The hubs, B and C, Fig. 2, with their pistons, revolve in the direction indicated by the arrows. M, Fig. 1, is a frame, having a bearing, N, upon which a driving shaft (see dotted lines), connected to the hub of the band wheel, revolves; said shaft passes through stuffing box, P, and connects with the driving hub. The band wheel, Q, revolves in the direction indicated by the arrow. R, Fig. 1, is an air chamber attached to a power pump to equalize the flow of water when thrown through a nozzle, on which is a coupling for attaching hose.

A combination of these various principles in this pump enables it, it is claimed by the patentee, to lift and force a greater quantity of liquid with a given power than any other pump in use, and places its value as a pump in the construction of steam fire engines beyond the question of a doubt.

For particulars respecting sale of territory, or orders for pumps, address Wm. R. Gorgas, Treasurer Drawbaugh Pump Co., Eberly's Mills, Cumberland Co., Pa., or David Stevenson, Jr., Manufacturer, Harrisburg, Pa. Patented, Nov. 20, 1866.

Fig. 1



Not long since Sir John Brown & Co., of the Atlas Works, Sheffield, required an accumulator cylinder 36 feet in length. The outer diameter was 36 inches, the inner 26 inches, for a 24-inch ram, and the total weight was to be about 25 tuns. Several makers tendered for the casting, in four 9-feet lengths; but Messrs. Tannett, Walker & Co., successfully undertook to cast it in one. They dug a pit in their foundery floor 34 feet deep, and built up a mold in strong cast-iron boxes, carefully jointed together. The casting was poured so that the lower half rose from the bottom, the upper half being afterwards poured from the top. The ferrostatic head of a column of iron 36 feet high is about 1 cwt. per square inch; so that the mold had to be very strong. The iron, before entering at the bottom, fell upon a wrought-iron plate, which broke the shock of the fall, and secured the steady rise of the metal in the mold. This remarkable work may be compared, with some reason, to a cast-iron gun 36 feet long, and of 26-inch bore—a gun heavier than the 15-inch Rodman. The casting was completely successful, and the cylinder is now in use at the Atlas Works.

Messrs. Tannett, Walker & Co

Fig. 4

DRAWBAUGH'S IMPROVEMENT IN ROTARY PUMPS.

Boiler Water from Gasometer Tanks.

Francis Carroll, of New Orleans, says at the gas works in that city, there is a boiler which has been in use fourteen years and has never collected a particle of scale. The feed water is drawn from one of the gasometer tanks which are supplied from the Mississippi.

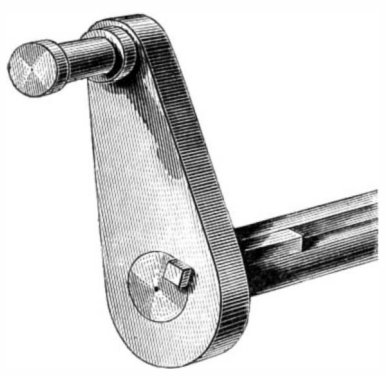
Bessemer Steel Plant.

The construction of converters, blowing engines, hydraulic apparatus, etc., for the Bessemer process has been chiefly carried on by two largs firms—one in Manchester, and the other in Bolton. In addition to these Messrs Tannett, Walker & Co., of Leeds, are makers of Bessemer plant, and are now making a pair of 6-tun converters for Sir John Brown & Co. The greater portion of the plant for a Bessemer steel works in America, that of the Freedom Iron and Steel Company, at Lewistown, Pa., was lately sent off from these works, as was also a heavy plate mill, with a pair of horizontal engines, of 3 feet cylinders, and five feet stroke. Messrs Tannett, Walker & Co. are almost exclusively engaged upon the machinery of iron and steel works, including blowing and mill engines, rolling mills, steam hammers, Bessemer plant, etc., with, occasionally, engineers' tools of special construction. The steam hammers have a peculiar and excellent valve motion, which we shall illustrate in an early number.

have made many tire-rolling mills, among them that which we illustrated some time ago, as in use at the new Grimesthorpe Works of Messrs. Charles Cammell & Co., of Sheffield. The same tire mills have been made for the Lowmoor Iron Company; the Bowling Iron Company; Messrs. Taylor Brothers, of Leeds; Messrs. Hood and Cooper, of Leeds; the Farnley Iron Company, etc.—*Engineering.*

SOUTHGATE'S IMPROVED KEY.

It is well known to machine builders that the ordinary wedge shaped key must be carefully fitted to hold whatever may be secured to the shaft, whether crank, pulley, or gear. The bearing of the key should be mainly on its sides or edges,



and not on its top or bottom. In the latter circumstance the case would be simply a wedge tending to split the hub it was to secure. Of course the action of the key should be principally on its sides.

In the engraving we have a key having four equal sides, the key so seated as to present two sides to the hub and two to the shaft, each having the same and an equal bearing. In the shaft and through the hub is cut a V-shaped spline or key-way, as seen in the engraving; machinists, however, will see that the key is not put in its proper place, but this was done in order to show the crank and the key-way on the shaft. It seems to possess an advantage over the ordinary key and can be made to fit equally as well. It certainly is worthy a trial. The principal objection we notice is the formation of a V-channel in the probable line of fracture, but for one of these lines on this key the ordinary key has two.

Patented through the Scientific American Patent Agency, Sept. 3, 1867, by B. F. Southgate, who may be addressed at Bridgewater, Vt.

A new Telescope for examining objects situated under water, was recently tested on one of the French canals. Reports affirm that pencil marks could be clearly distinguished at a depth of more than five feet. Its practical application will be the examination of the hulls of vessels without its being necessary to dock them.

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☞ "The New York News Company," 8 Spruce street.

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VOL. XVII., No. 17....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, OCTOBER 26, 1867.

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ONE CAUSE OF BOILER EXPLOSIONS.

Whenever a boiler explosion occurs, the attention of the coroner's jury is directed to the discovery of imperfection in the material or workmanship, or a wrong principle in the form and arrangement of the parts. Frequently the engineer and fireman, or the individual who combines both these offices in himself, is removed by the explosion from all opportunity to give his testimony, and the proprietors are unable, if not unwilling to give light on the subject. Sometimes the engineer or fireman is censured, but seldom is the employer reprimanded for his dereliction of duty.

A correspondent, himself a practical engineer, says that it is surprising there are not more explosions. He says that in Connecticut the engineer is often required to be his own fireman, to split his wood, do every "chore" in and around the engine house, and oil the shafting, mend the belts, etc., for the whole establishment for from $1,50 to $2 per day. He asks, "who is going to study and fit himself for an engineer with such remuneration and such duties before him? When the inspectors were last around, they asked one engineer how much his safety valve carried. He replied he did not know what the safety valve was; no one had told him! He had used it to pile wood upon to dry. It being set at eighty lbs., he took hold of the end of the lever to lift it, but it had stuck on its seat, and he was compelled to use a lever to raise it. Another, besides the weight, had a large casting hung on the lever. When asked what it was for, he replied: so it would not blow off. Being told he must have it so as to blow off, at a certain pressure, he said he was not going to have it so it would blow off at all; and added, that the engineer who was there before him had it blowing off nearly every noon, but he had not had it blowing off since he had been there, which was about twelve months. I have seen boilers, where they had been using acids in the water, and the boilers were very badly corroded; still they would not change the feed pipe to good, pure water because it would cost, perhaps, fifty dollars. If any of these boilers had exploded, they would have looked for fault in construction, or want of water, or something of the kind."

"Now why don't our State Legislature make a law prohibiting any one from running an engine who shall not prove he is a competent engineer, and so stop the loss of life which follows these explosions?"

RAISING OF WATER BY CREATING A VACUUM.

Even before the time of James Watt it was well known that by creating a vacuum in a closed vessel, by condensing the steam with which the vessel was filled, the pressure of the atmosphere would carry water through a pipe to the vessel; yet it is singular that this mechanical fact has never, until lately, been turned to practical account. A correspondent proposes to create a source of power by building a tank into which he leads a siphon connecting with the water. He proposes to work the siphon by exhausting the air. The water thus raised to be used on a wheel.

There is in this city a model of a contrivance by which water is raised and discharged on a wheel, the same water being used over and over again, the only loss being that occasioned by evaporation, which is easily made good by a small pump. The process is to introduce steam—the exhaust of a non-condensing engine is sufficient—into a reservoir connected by a pipe with a supply of water below, and then, by a jet of water condense the steam, creating a vacuum which is instantly filled with water to be discharged into a flume or reservoir, and thence lead to a wheel. It is surprising how much water a quarter-inch steam pipe will furnish the power for raising. A flour mill, we are told, is now running by this method in Virginia, not far from Chambersburg, Pa. This method of utilizing the waste steam of engines seems to promise very satisfactory results.

PLASTER OF PARIS—GYPSUM.

This substance possesses some peculiar properties. It consists of sulphuric acid, lime, and water, its composition, or rather the proportion of its component parts being similar to that of alabaster. Its abundance in the tertiary basins around Paris has given it the name of plaster of Paris. It is found in Nova Scotia in profusion in the lower carboniferous rocks. It is produced by the decomposition of iron pyrites and limestone in juxtaposition. It is formed wherever sulphuric acid is generated and comes in contact with carbonate of lime. Crystallized gypsum is called selenite, and the ancient Romans are said to have used it as glass. It is often colored by oxide of iron, to gray, brown, red, yellow, and even black.

It is used extensively for making plaster casts and for stucco. It is prepared for these purposes by calcining, which is simply heating it in kilns or kettles until the water is expelled. It is then a fine powder, like wheat flour, and to be used must have the water which it previously held returned to it. To preserve it from contracting the moisture in the atmosphere, it should be kept as nearly air-tight as possible. Much of the plaster or gypsum sold in the market is deteriorated by careless handling and packing. When mixed with water it "sets" quickly, and no time should be lost between the mixture of the gypsum and the taking of the cast. Of late years it has been a favorite substance with dentists in taking casts of mouths to which teeth were to be fitted. We know of no way by which this substance, being once used, can be brought to its original state.

It is used to some extent in glazing porcelain; but it is more largely used as a fertilizer of soils than for any other purpose. Containing a large proportion of sulphate of lime, it is extensively used as a manure. It is excellent for grass of all kinds, furnishing just the nutriment needed.

Petroleum for Steam Fire Engines.

We notice that at a late fire in Boston one of the steamers was run by petroleum oil instead of coal. The *Traveler* says: "When the alarm was given the steamer started in the direction of the fire, and arriving at the scene of conflagration, her steam gage indicated 100 pounds of steam. Only three minutes were consumed in raising this amount of steam. She remained on the ground six hours and a half, and during that time the steamer averaged 80 pounds of steam and 120 pounds of water pressure, and 100 pounds of water-pressure with two streams. Another remarkable and important fact demonstrated was the steamer, using oil, gained 30 per cent of water pressure over any other engine at the fire, by reason of not choking the exhaust. This is regarded as a great desideratum gained. Another great point shown was, while the streets leading to the fire were choked up with smoke thrown off by the other steamers, scarcely any smoke came from No. 3, using the new fuel."

While we have doubts as to the advantage of substituting petroleum for coal on steamships, we believe that it is possible to contrive an apparatus for its combustion which will be of real value in such cases as the above.

Tortoise Shell.

A correspondent inquires as to the production and manufacture of tortoise shell. It is the product of a marine tortoise or turtle generally known as the "hawk's bill." The shell, so called, is in reality only the outer covering of the shell proper, and is found simply as scales or plates. These are removed by the application of fire. The turtle is caught and secured to the ground, when a light fire is built on his back, which loosens the plates so they can be removed by a knife. The animal is then left free and the separate plates are in time replaced by a solid plate or shield. The shell is rarely removed from animals weighing less than 160 or 170 pounds, as it is too thin for use in the arts. The shell is manufactured into various articles by being softened in hot water, which renders it pliable and nearly plastic. It is largely manufactured in Providence, R. I.

Comets and their Tails.

A correspondent from Galveston, Texas, sends a well written, illustrated article on the above subject in which he advances the idea that the comet has "no tail at all; only by darting along with the utmost rapidity, its sphere yields to the impression of atmospheric air and assumes the shape generally seen." We were of the opinion that the orbits of the comets were beyond the reach of atmospheric influences.

Navigating the Air.

Mr. Frank Oliver of Biddeford, Me. writes that he has constructed a machine by which he can sustain himself in the air by working a crank, and sees no reason why larger machines propelled by steam power could not work. If our correspondent will send a description and drawing of his machine we shall be glad to publish it. "It is wonderful if true."

American vs. English Muscle—The Yankee Wins.

We see by a cable telegram of the 11th inst. to our daily papers that the jury who had the matter of testing the Chatwood and Herring safes at the recent farcical trial in Paris, have decided our countryman the winner of the wager. What will Mr. Bull say to that?

FAIR OF THE AMERICAN INSTITUTE.

DEPARTMENT OF THE DWELLING.

Entering the exhibition halls by the main door, and turning either to the right or left, the visitor finds himself in the section allotted to the display of articles of domestic utility, an extensive and varied collection, embracing all apparatus for warming, lighting, cooling, and ventilation; all kitchen utensils and machines for washing and preparing clothes; cabinet and table furniture; ornaments for the dwelling, and building accessories and permanent attachments. So large is the number of articles which are properly classed under this comprehensive division, that a mere mention of each would make a report too voluminous for our columns, and we must limit ourselves to a brief note of a few of the more especially prominent.

In the section allotted to the exhibition of cooking and warming apparatus is the Imperial Range, made by Moneuse & Duparquet, measuring 27½ feet long by 5 feet 9 inches wide. There are eight fire-places, two broilers on one end, fourteen baking and eight warming ovens. The flues are led off below the floor and the range is accessible on all sides. Near this range is placed a four-oven caboose with its accessories, made by Thos. M. Sheppard, also a brass yacht stove and several creditable specimens of copper work, by the same manufacturer. Bramhall, Deane & Co. exhibit a large French range for which they claim economy of fuel, simplicity of management, and by the employment of a patent water front, great external coolness.

The Francestown soapstone works show several soapstone stoves, which from their novelty attract considerable attention. A stove having several new features and rejoicing in a somewhat pretentious title, is Calvin Pepper's Radical Cooking Stove. The air is here fed to the fire through a perforated metal plate covering the entire upper surface of the fire, so that the combustion actually proceeds from above downward. Cooking can be done by radiant heat alone, the flame and heated products of combustion passing beneath the kettles, etc., into and around the baking oven. Although designed for burning coal or wood, it can be readily converted into a petroleum or coal gas burner. In the assortment of gas stoves we notice the Union and the Dome cooking stove. The latter has the perforated plate which is common to all gas stoves, so situated as to be beyond the reach of dirt, or accident, or damage from the flame, and has moreover an air tube through the burner bringing an upward current of air in contact with the aerified gas at the point of ignition, securing a strong and steady flame, and free from that almost universal evil of gas stoves, their unpleasant odor.

Before leaving this group we must notice the case of grates, fenders, and fire irons exhibited by Messrs. Jackson & Co. Theirs is conceded to be the handsomest display made by any exhibitor in the section.

Messrs. Jackson & Co. have on exhibition at their new and elegant warerooms in Union Square an arrangement for heating rooms by burning gas in an open fireplace which is very ingenious and attractive. The gas jets are so concealed in imitations of logs of split wood that when ignited the fireplace has the appearance of containing a glowing wood fire.

For lighting our dwellings, the petroleum lamp makers present for inspection a varied collection of their wares, Julius Ives & Co. having perhaps the largest assortment. One of the good points in the Ives lamp is the arrangement of a tube in the burner, providing thereby a means for filling without the inconvenience of unscrewing or removing any of its parts. The shade and chimney are combined with the cone of the burner, and all are opened together by a hinge whenever the wick is to be reached, or the lamp filled or lighted. Danford's atmospheric lamp dispenses entirely with chimneys, a brilliant and steady flame being obtained by supplying artificially a steady stream of oxygen around the flame, a train of clockwork in the base of the lamp furnishing the means for accomplishing this end.

Next to the stoves and heating apparatus, by way of contrast, are placed the refrigerators. One of these household necessities exhibited by Stephens & Ritchie has slate substituted for charcoal, as a non-conducting medium, thereby doing away with the dampness and musty odor which often arises from refrigerators lined with other substances. The Zero refrigerator, a too suggestive name to be attractive at this season; also a milk, wine, and water cooler, which is a convenient article for householders, are exhibited by Alex. M. Lesley.

Confronting the visitor at his entrance into the main hall is one of Frink's double-cone reflectors. This is but one of an assortment of these contrivances, which are intended for economizing, by concentration, of gas, kerosene, and daylight. The body, of the form required, is made of tin, and is covered with plates of glass corrugated upon one side. For lighting public buildings or show windows these reflectors are to be highly commended.

Leaving for the present a description of the imposing array of washing machines of every conceivable construction, and which from their number require a report by themselves, we turn to the group under which cabinet furniture is classified. First stands the invalid bed, invented, as a circular informs us, by a soldier while lying sick in hospital. The bed is divided into three equal parts, each of which may be inclined at varying angles, allowing the patient to assume a variety of positions, changes very acceptable to the invalid.

Mr. A. S. Lyman presents for public approval a bedstead constructed on the principle illustrated in these columns some time ago. The object of his invention, it will be remembered, is to filter and purify the impure air supplied to the sleeper for respiration, to dry it when too damp, and in summer to cool it. To effect this the head board is made

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double, to serve the purpose of a reservoir for holding some lime, charcoal, and ice. The former is placed beneath the bed, so that the currents of cold air near the floor are made to pass over it, when the moisture and carbonic acid are absorbed. By this means the air is warmed and rises through a charcoal filter, when if required during the summer season, it passes over ice, finally emerging through an opening directly over the pillow. The effect of this constant current of pure air, is first, that more of it is taken into the lungs, and thereby the whole system is stimulated and the health improved. A pamphlet before us explains further why there is no danger of taking cold, and why sleeping in pure air tends to protect from diseases resulting from exposure during the day, the testimony on this point, as well as to the merits of the apparatus, being that of many eminent physicians of this city.

Several ingenious combinations of household conveniences, useful when economy of room is a desideratum, are shown, explained, and operated by their respective inventors. Brewster's ironing board, hat rack, table, and closet; McMore's writing desk and table; Phelan's combined dining and billiard table; Bennett's table-bed, and combined seat, sofa, bed, sick chair, and rocking chair; these all have such expressive titles that further notice is unnecessary. Luckow & Nachtheim's circular extension table is in form the segment of a circle; thereby, it is claimed, it will seat a larger number of people in a smaller space than the old-style long table. The conversational element in a party dining at one of these tables must of necessity be somewhat limited, as fully one half of the company sit *dos à dos*. The table is made of ten parts, which may be separated and a small center or ordinary dining table can be made.

The adjusting and folding chairs made by Chas. C. Schmitt are advertised as the most elegant chairs manufactured, and from an inspection we are inclined to admit the claim. The upholstery is elegant and the form of construction affords the greatest comfort to the body.

The constant jingling of a bell invites public attention to E. Holmes' burglar alarm telegraph, which is so arranged that the opening of a window or door when the apparatus is set, completes a magnetic circuit, and an alarm is sounded, much to the discomfiture of the baffled intruders. Webb's Universal Protector subserves a like purpose, but in a different way. Dispensing with a battery, in this arrangement a gong bell over the door or window has a train of clockwork within it, which when wound up is set off by inserting a key in the lock of the one, or attempting to raise the other.

Brown's carpet stretcher and tack-driver is an instrument by which the operator can stretch and tack down a carpet at the same time, and with as little effort as the subsequent sweeping of the same may be accomplished. The American papier mache manufacturing company have an assortment of pails, basins, toilet sets, milk pans, spittoons, etc., all made of chemically prepared paper, yet which are impervious to the action of water and acids. These articles may be placed in an oven until water will boil in them, without injury; and, furthermore, they will not break, shrink, water soak, rust, or fall to pieces. The manufactory of this company is situated at Greenpoint, L. I.

PUMPS, MACHINERY, TOOLS, ETC.

There is quite a collection of power and hand pumps in the exhibition, all of them worthy of attention and some of them possessing merits so obvious that the mechanic cannot overlook them. The Metropolitan Rotary Engine Co. exhibit a very powerful pump, which delivers a beautiful round stream. It is a rotary pump very compact and quite simple in its internal construction. The builders claim that it will maintain a vacuum of twenty-eight inches, and during a trial of seventy-two consecutive hours a constant vacuum of twenty-nine and a-half inches was maintained. It seems to be well designed for durability as well as efficiency; it certainly appears to be as durable as any rotary pump can be expected to be.

The steam pumps exhibited by the Niagara Steam Pump Works, 9 Adams St. Brooklyn, N. Y., are excellent hydraulic machines. One style has the piston rod of the steam cylinder in common with that of the pump chamber—the machine being horizontal. Another has a crank, and the engine and pump can be readily disconnected so that the former may be used to drive any machinery.

Messrs Terwilliger & Co. exhibit some of their welded steel and iron burglar-proof safes. They are composed of a series of plates made of steel and iron welded, the steel outward, secured by conical bolts running through and through. Each plate is separately held, so that if one is forced off, the remainder are not thereby weakened. We venture to say that it would be impossible to throw open the side of one of these safes in twenty-nine minutes if operated upon in the same ridiculous manner as were those at the Paris Exposition.

Dion's Fire Detector is intended to give an alarm of fire instantly. It does not depend upon magnetism or electricity, but its parts are absolutely connected, and it is governed wholly, in its action, by the variation of the common thermometer. Its principle and operation appear to be faultless. The office is at 80 Cedar st., N. Y. Ward's Dish Washer and Dryer is a portable tank for holding hot water, having a shaft running longitudinally through it on which are two disk brushes of wood for washing, and two similar disks faced with sponge for drying. It does its work with dispatch and thoroughly.

Fuller's Tuck Creaser, attached to a Wheeler & Wilson sewing machine in the north gallery, is a device which seems to be a great attraction, especially to lady visitors. It can be attached to any of the sewing machines in use and is intended to fold or crease the fabric to be sewed into plaits. For shirt bosoms and skirts it is just the thing. The operator has only to guide the cloth when the plaits will be laid narrow or wide, according to an adjustable guage, and securely held by stitching.

We notice two knitting machines, the Bridgeport, Conn., machine and the Hinkley machine made at Bath, Me. The former knits a tube, the dimensions of which—or the "narrowing and widening"—are governed by the removal or insertion of needles by the operator. It is very compact and quite simple. But we think for simplicity and actual usefulness persons interested in such machinery should examine the Hinkley machine. An illustrated description of the latter will soon appear in these columns.

Next to the card machine—which we have not room to notice this week—there is no machine which deserves the attention of visitors more than Clark's Spooling Machine. It is certainly a curiosity. The empty spools—those on which the sewing thread is wound when purchased from the stores—are placed in a movable hopper, and when one is filled, which is done with great rapidity, another empty spool is automatically raised to a position where the spindles engage with it, and the end of the thread is instantly passed into a slit in the head of the spool, when the thread is rapidly wound in concentric layers up to the top of the heads. This done, the filled spool drops instantly out of the way, the thread being cut and fastened into the slit in the head, when the machine is ready for another spool.

Cory's Angular Bit-stock is a device for boring holes in places impossible to be reached by the ordinary auger, and preferable to the "universal joint" bit-stock so generally used. Gas fitters, plumbers, and carpenters should examine this useful tool.

Notwithstanding the excellent good management of the fair we have to record two serious accidents. A mechanic named P. McGowan while attempting to remove a cent from the anvil of the Goulding & Cheeney's drop hammer had his hand smashed by the descending hammer and amputation was found necessary. He has a family, and a subscription for his relief has been started. Visitors at the fair may hand their contributions to manager Hicks or chief engineer McElroy.

On Thursday the 10th, Dean Linnell, the engineer of the Babcock & Wilcox engine, fell into the fly wheel, and after being whirled several times around, was thrown with great violence on the Getty pump, breaking off the air chamber, of cast iron. His collar bone was broken and it is feared he was much injured internally. He has a wife and child in Providence, R. I.

The fair will close Oct. 26th, and those who feel interested in the mechanic art should embrace the opportunity to witness one of the best exhibitions ever seen in this country.

ISHERWOOD'S COG-WHEEL PROPELLER ENGINE--AN INTERESTING COMPARISON.

Several of the British built screw propeller steamers, as is well known, frequently make passages both ways across the North Atlantic at the average rate of 14 knots (of 6,086 feet) per hour. These vessels are of about the same size as the *Wampanoag* class of screw steamers built by the Navy Department with machinery planned by the Chief of the Bureau of Steam Engineering. Hence a comparison between these vessels with respect to their speed cannot fail to be interesting. Let us take the screw steamer *Periere* engined by Napier of Glasgow, which has made so many rapid runs; the immersed midship section of this vessel is nearly the same as that of the *Wampanoag*, and as to the models it is pretty certain that the latter is considerably the best, as one of our most skillful naval constructors, Mr. Delano, "spread himself," as the saying is, in modelling this ship. The *Pereire* has more than once steamed across the Atlantic at the rate of 14 knots and when put on her mettle has easily attained in "smooth water uninfluenced by wind or tide" 15 knots. According to Mr. Isherwood's official report he contrived the steam machinery of the *Wampanoag* to give her "a maximum speed of 15 knots per hour."

The engines of the *Pereire* are direct acting and the whole of her steam machinery weighs only some 650 tuns including the boilers, while Mr. Isherwood's machinery in the *Wampanoag* class weighs some 1,200 tuns. This immense difference shows how little practical knowledge the Steam Department of the Navy possesses on the important subject of marine engineering.

In this case, throwing aside for the present the improper proportion of the details, this enormous difference in weight may be, for the most part, accounted for by the fact that the Chief of the Bureau of Steam Engineering, in spite of the remonstrances of the most distinguished engineers in the country used an inferior boiler known as "Martin's patent" (employed only in the U. S. Navy), and also interposed between the engines and the propeller eighteen cog wheels of immense size and weight.

It seems that the scores of direct-acting engines heretofore contrived by this officer for the Navy, had given such wretched results that it is attempted in this case to achieve success by cramming a sharp vessel with that exploded engineering makeshift a "cog wheel" or "geared" screw engine. The plan of connecting the engine to the propeller by means of cog wheels is not so very objectionable on a smaller scale; but when this device is applied to engines working up to the great power these engines are required to develop in order to give the stipulated speed to the vessel, the weights, the space and the complication are so greatly increased and practical difficulties of such a formidable character are entailed by the use of cog wheels, of such proportions as these, that no one with adequate engineering judgment would entertain the idea of using them after he had scrutinized the subject.

We sincerely hope, as the *Wampanoag* is the pioneer of four more of the same kind, that she may be a great success in point of sustained high speed; for failing in this point they will be practically worthless as war vessels.

Of course, the further a comparison is pushed between such machines as the engines of the *Periere*, etc., and those of the *Wampanoag* the more strongly is the want of engineering skill and common sense on the part of the designer of the steam machinery of the latter made manifest.

For instance the *Wampanoag* is so loaded with boilers, smoke pipes and "cog wheel" engines that she cannot carry near coal enough in her bunkers to cross the Atlantic at top speed, as is constantly done by many screw vessels—such as the *Periere*. And so much space is filled with machinery on the *Wampanoag*, that a large portion, of even the small amount of coal she can stow, is carried in bunkers built on the deck in the quarters of the crew, instead of in the hold, as is the case with the other vessels we have alluded to. Yet, as we have seen, although such an immense space in the *Wampanoag* is devoted to machinery, and bunkers are built in the quarters of the men, she is unable to carry coal enough to cross the Atlantic at such speed as it is frequently crossed by working vessels of much less pretensions and with only *one* pipe. It is only by running at low speed and practicing economy that such a voyage could be made under steam.

We think that this fact alone is sufficient to stamp the steam machinery of the vessel as a blunder without parallel, of its kind.

And finally to make the matter still worse it should be remembered that the *Wampanoag's* engines are so tied up by the proportions of the cog wheels that when they are working to their full power they must be operated in accordance with the "seven-tenths cut-off theory" as laid down in the Steam Blue Books of the Navy Department. In other words the pistons move at so low a speed that the steam must follow them at least seven-tenths of stroke, in order that they can work off the steam from her twelve boilers.

While the other vessels to which allusion has been made are worked with an independent cut-off the *Wampanoag* must work practically "non expansively."

Hence this highly improper distribution of steam, for engines of this magnitude, decreases still further the power of the already inadequate supply of fuel.

Delicious Coffee.

One of the most delightful features of a breakfast is good coffee. Broiled chickens, Spanish mackerel, fresh eggs, and light rolls make a good breakfast, but the flavor of all these edibles may be spoiled by a cup of poor coffee. We have recently had in use a new coffee pot called the "Aroma Condenser," invented by N. Holtz, of Greenpoint, L. I, which has given the most perfect satisfaction to our household.

The means by which the desirable property of a good cup of coffee is attained are very simple. A coiled pipe, similar to the worm pipe of a still, leads from the vessel containing the coffee into a chamber above, into which cold water is poured after the coffee commences to boil. The steam rising into the coiled pipe is thus condensed, and the water with the aroma which in common coffee pots is allowed to escape, is conveyed back into the vessel containing the coffee. The same plan of a pot is said to be equally adapted to making tea.

Probable Uses of the Telegraph.

An exchange asks: Why should not every house have its telegraphic wire? When gas was first applied to purposes of illumination. it was used only in the public buildings and streets, and even now on the continent of Europe it has been introduced but sparingly into private dwellings. Why may not the telegraph wire be extended and diffused—if we may say so—as the gas pipe has been. Suppose a network of such wires laid from a central point in the city to the library or sitting room of every dwelling, and an arrangement made for collecting news similar to that controlled by the associated press. Through the wires, then, this news might be instantly communicated to each family, without the work of time rendered necessary to put it into type, print it, and distribute it by means of carriers. A fire, a murder, a riot, the result of an election, would be simultaneously known in every part of the city. Of course, this would do away with newspapers, but what of that? All things have their day, and why should such ephemeral things as newspapers be an exception to the rule?

Boring Rock With an Eight Tun Drill.

In No. XIV., current volume, page 215, we made, in our column of Manufacturing, Mining, and Railroad Items, a notice of the performances of a rock-drilling machine, which, it was said by "the papers," sunk four feet into the solid rock at every blow. The work was being performed at the Keokuk Rapids, on the Mississippi, in Rock Island county, Ill. In reply to our desire to know the structure of rock which could be thus penetrated by a single blow, a correspondent, A. C. S., of Sabula, Jackson county, Iowa, sends us the following statement:—"A fine-grained, compact, and homogenous rock, exhibiting but little trace of crystalline structure until examined under the microscope, when it shows a conchoidal fracture. It is somewhat soft, but grows harder after exposure to the atmosphere. He says it is believed by some that the contemplated improvement in the navigation of the river will prove a failure."

Preservation of Anatomical Subjects.—The object which is to be preserved is dipped in a mixture formed by adding to seven parts glycerin, one part brown sugar and half a part niter, until a slight deposit begins to be perceived on the bottom of the vessel. Putrefaction is thus entirely prevented, the object when taken from the solution being perfectly rigid, but by hanging it in a warm and dry place, the muscles and articulations will recover all their pliancy.

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OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING OCTOBER 8, 1867.

Reported Officially for the Scientific American

PATENTS ARE GRANTED FOR SEVENTEEN YEARS the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

69,530.—GRAIN DRYER.—J. W. Adams, Elyria, Ohio.

I claim the chamber, D, pipe, B, and diffuser, C, arranged in combination with the shell, A, for the purpose and in the manner substantially as set forth.

69,531.—LEMON SQUEEZER.—A. Barbarin, New Orleans, La.

1st, I claim the combination of plunger, K, when provided with the spring, b, and otherwise constructed, substantially as herein described, and the receiver, A, when the latter is provided with the vibrating or tilting perforated diaphragm or bottom, C, as and for the purpose set forth.

2d, The above combination, in combination with the frame, B G, H J, as herein described, for the purpose set forth.

69,532.—SEEDING MACHINE.—H. Barber, D. C. Van Brunt, and G. W. Van Brunt, Harrison, Wis.

1st, We claim the arrangement of the gear wheel, I J K, and lever, F, and stop, f, beneath the machine, and remote from the wheels, for the purposes specified and substantially as described.

2d, We claim the combination and arrangement of the axle, G, gear wheels, I J R, lever, F, and stop, t, operating substantially as and for the purposes described.

3d, We claim the arrangement of the stop, f, with respect to the bent lever, F, and pinion, J, substantially in the manner for the purposes specified.

4th, We claim the arrangement of the slide, m, provided with the arm, n, with the toothed lever, N, as and for the purposes described.

5th, We claim, in combination with the last foregoing, the arrangement of the scale and pointer, p, for the purposes set forth.

6th, We claim the peculiar construction of the segment, k, and its arrangement with the lever, R, for raising the plow, as and for the purposes herein described.

69,533.—DRILLING MACHINE.—G. W. Bishop, Stamford, Ct.

Antedated Aug. 27, 1867.

1st, I claim the combination of the arbor, C, screw-rod, D, wheel, G, and friction clutch, I, arranged and operating as herein shown and described.

2d, The combination of the cam-lever, P, with the bracket, J, perforated back plate, R, and pins, o and m, substantially as and for the purpose herein specified.

3d, The combination of the arm, L, and plate, M, with the bracket, J, constructed and arranged substantially as and for the purpose specified.

69,534.—MALT KILN.—Wm. Blakey, Baltimore, Md.

1st, I claim the provision in a malt kiln of mechanical appliances for stirring the grain, substantially as set forth.

2d, The combination of one or more steam pipes, and a furnace for supplying heat in a malt kiln or grain dryer, substantially as and for the purpose set forth.

3d, The combination with a malt kiln, of the worm, E, and condenser, F, substantially as and for the purpose described.

4th, A galvanized iron casing in a malt kiln, for the purposes set forth.

69,535.—GATE.—L. F. Brown, Keokuk, Iowa.

I claim the cranks, F F', with their cylinders, the posts, E E', pulleys, H I, H' I', K K', the cylinder, G G', and rope, L L, or their substantial equivalents, combined and arranged as and for the purposes set forth.

69,536.—COOKING STOVE.—Charles H. Buck, St. Louis, Mo.

I claim providing the doors of stoves with concavo-convex glass windows, secured within flaring openings through the stove doors by means of rings, h, substantially as described.

69,537.—HEATING STOVE.—Charles H. Buck, St. Louis, Mo.

I claim the construction of the stove with a fire pot above the middle plate of the outer cylinder, such fire pot being surrounded by a perforated air chamber, C, in combination with a perforated conic hood, G', which has a cylindric terminus, a a, all arranged and operating substantially in the manner and for the purpose described.

69,538.—CHURN.—Thomas W. Buck, Fawn River, Mich.

I claim the valve, E, with its removable sieve-like slide, when employed for the uses and purposes expressed.

I further claim the arrangement of the valves, D and E, constructed and operating substantially as shown, for the purposes set forth.

69,539.—PAPER FILE.—Francis Buhl, Newark, N. J.

I claim the paper file described above, consisting of the back, a, with pins set in its face, and clamp, b, with a slot or holes to receive said pins, said clamp being held at one end by the spring, c, or its equivalent, and at the other end by a tapering bolt, which by its taper adjusts itself to the thickness of the papers inclosed, and holds the clamps tightly upon them.

69,540.—SASH LOCK AND SUPPORT.—F. P. Canfield, Boston, Mass.

I claim, 1st, The combination as well as the arrangement of the friction roller, W W, and a bolt, N N, substantially as described and for the purpose set forth.

2d, The friction roller, W W, when made with the two cylinders, W W, connected by a smaller toothed axis, V, in combination with the incline, C, substantially as described and for the purpose set forth.

69,541.—MACHINE FOR SHEARING SHEEP.—Charles P. Clark, and Lewis Delent, Beaver Dam, Wis.

We claim, 1st, The revolving knives, e e, substantially as set forth.

2d, The comb or series of guards, H, substantially as herein described, and for the purposes set forth.

3d, The revolving knives, e e, the guards, H, in combination with the wheel, d, the frame, a a, and the gearing, F, substantially as and for the purposes described.

69,542.—STEAM HEATER.—Edward B, Josiah S., and Wm. S. Clark, Philadelphia, Pa.

We claim, 1st, The combination substantially in the manner described, with an ordinary stove for warming buildings, of a coil of steam pipes, provided with an automatic feed valve, which supplies water as fast as evaporated, thus maintaining the water at an uniform level, preventing the burning of the pipe, and dispensing with an external steam drum.

2d, The combination substantially as described of the water drum and float valve, with the heating coil and balancing pressure pipes, for the purpose of preventing pressure on the valve.

69,543.—WOOD LATHE.—Henry T. Clay, Philadelphia, Pa.

I claim, 1st, The spring, e, or its equivalent, arranged on the grooved wheel, F', as and for the purpose described.

2d, The construction of the wheels, U U', each consisting of two disks, r and r', with an intervening ring of gum elastic, when the said disks can be adjusted toward each other for the compression of the ring as set forth.

69,544.—TURNING LATHE.—F. W. Coy, Boston, Mass.

I claim the combination and arrangement of the belt wheel, C, the bearing, H H, the cap, D, and the spindle, B, substantially as described and for the purpose set forth.

69,545.—GRAIN SEPARATOR.—Amasa Curtis, Warren, Ill.

I claim, 1st, In combination with a shoe constructed as herein described, I claim the arrangement of the spouts, F F, with the opening, c, into the same, in the manner and for the purposes herein specified and shown.

2d, The opening, m, in the rear end of sieve, I, arranged in combination with the side spouts, F, substantially in the manner and for the purposes set forth.

3d, The arrangement of the boards, K L, in such a manner as to bridge the opening, d, and discharge at opening, c, into side spouts, F, substantially as and for the purposes described.

4th, In combination with the said false bottom, K L, I claim the sieve, J, provided with the air stop, J', arranged and operating as and for the purposes specified.

5th, The slide, M, and board, N, when arranged in combination with the shoe provided with a close bottom, substantially as and for the purposes described.

6th, The arrangement of a series of fine sieves, R, below the sieves, P, and terminating at and in combination with the side spouts, F, substantially as and for the purposes set forth.

7th, In combination with an overshot fan blast, I claim the arrangement of the regulating valve, C, so as to operate in the manner herein specified.

8th, The arrangement of an air blast regulator, D, in combination with a grain separator shoe, provided with a close bottom, substantially as described.

9th, The arrangement of the reversible feed regulator, B b, in combination with the hopper of a grain separator, as and for the purposes specified.

10th, Suspending the shoe upon springs, S, in combination with knuckles as and for the purposes set forth.

69,546.—TRACE FASTENING.—D. W. De Forest, B'lyn, N. Y.

I claim the construction of the head of the shank or stem of the fastener, with its under side countersunk to receive the head of the pin, in combination with the same, substantially in the manner and for the purpose as herein specified.

69,547.—DEVICE FOR MANUFACTURE OF WATCH KEYS.—Virgil Draper (assignor to Oscar M. Draper), North Attleboro, Mass.

I claim the combination of the shank holders, the dies for forming the heads, those for forming the pipe projections, and those for forming the cavities in such projections as set forth.

69,548.—HARNESS SNAP.—George B. Durkee, Alden, N. Y.

I claim a harness snap, composed of the tube, A, or equivalent, hinged hook, B, and spring, D, constructed, arranged, and operating substantially as herein described.

69,549.—HARNESS SNAP.—George B. Durkee, Alden, N. Y.

I claim, 1st, a harness snap, having a spring lever and stop, C, constructed and operating substantially as herein described.

2d, The combination of the hook, A, shank, A', stop lever, C, and either one or both springs, B B', arranged substantially as herein set forth.

69,550.—HAME.—George B. Durkee, Alden, N. Y.

I claim, 1st, The telescopic joint, N C, constructed and arranged in the manner and for the purpose substantially as herein described.

2d, The link, D, in combination with the adjustable loops, D', for the purposes and substantially as described.

3d, The slotted hook, E, in combination with the hinged lever, E', constructed, arranged, and operating in the manner and substantially as herein described.

69,551.—MACHINE FOR SEPARATING THE EXTERIOR OR BARK FROM THE INTERIOR OR PITH OF SORGHUM, AND OTHER PLANTS.—R. N. Eagle, and William F. Goodwin, Washington, D. C., assignors to themselves and Wm. Duane Wilson, Des Moines, Iowa. Antedated September 5, 1867.

1st, I claim a barrel or case adapted to receive and inclose the stalk or cane for the purpose of effecting a separation of the bark or woody substance, from the pith or interior.

2d, A tube or tubes provided with a sharp edge or annular knife, on the small end, which enters the cane between the bark and the pith, thus separating the bark or exterior from the pith or interior parts of stalks or canes, constructed as described, and operated in any manner or by any means whereby the tube can be made to accomplish the purpose set forth.

3d, A yielding tube or collar, U, hinged or attached to the plate, I, or its equivalent, around the hole or mouth of the chamber of the barrel, A, at one end, and held together by the spring, u, or its equivalent at the other end, and which collar incloses and hugs the small end of the tube. B, thus forming a conductor which guides the end of the cane to and centers it on the end of the tube, B, constructed and arranged to operate in the manner and for the purpose substantially as described.

4th, The piston or pistons, H, with the rod or rods, P, which operate in the chamber or chambers of the barrel or cases, A, and serve to discharge the cane from the same, arranged to operate in the manner and for the purpose substantially as described.

5th, The handles, O and O', bars, Q and Q', levers, L and L', arms, K and K', wedge, V, and pins, V1 and V2, and plate, T', constructed and arranged to operate in the manner and for the purpose substantially as described.

6th, The cross head, T, guide rod, G4, bars or pitmen, R and R', cranks, N and N', and shaft, x, arranged to operate in the manner and for the purpose substantially as described.

7th, The plates, I I I, which serve as a means of attachment for the barrels, A, and collar, U, and being securely attached to the under side of the platform, F, serve to hold the barrels and collars in their places, arranged in the manner and for the purpose described.

8th, The hopper or hoppers, J, and trough or troughs, E, constructed and arranged in the manner and for the purpose set forth.

9th, The saws, S' S', shaft, W3, pulley, W4, and platform, W2, constructed as described, and arranged to operate in the manner and for the purpose set forth.

10th, The saws, S S S, shaft, W', and box, B O X, constructed and arranged to operate in the manner and for the purpose described.

11th, The platform, or frame, E, to which the several parts of the apparatus are attached, arranged in the manner and for the purpose set forth.

12th, The fork or spreader, G, for the purpose set forth.

69,552.—DERRICK.—Francis M. Everingham, Lafayette, N.Y.

I claim the described derrick, and all the parts as arranged.

69,553.—WAGON BRAKE.—Corydon A. Fargo, Soquel, Cal.

I claim, 1st, A brake, constructed with the arm, E, and link, G, together with the connecting rods, D and 1, having a variable connection with E and G, respectively, or their equivalents, operating substantially as and for the purpose herein described.

2d, The vibrating suspended arms, c c, and the cross bar, d, attached to the bar, K, for producing parallel motion, substantially as herein described.

69,554.—DOUBLE EYE-GLASS.—John Federhen, and Wm. C. Sherman, Boston, Mass.

We claim a double eye-glass, provided with an elastic band attached to the arms for the purpose specified.

Also, The pressure bands or elastic pads, G G', attached to the inside of the frame, substantially as herein described, and for the purpose specified.

69,555.—HILL SIDE PLOW.—F. Feldhaus, Baltimore, Md.

I claim the construction, combination, and arrangement of the board shank, a, and movable mold board, c, as shown.

Also, the segmental clevis, d, either horizontally or vertically arranged as described.

Also, the flanged share, S, as constructed and applied.

69,556.—GAS BURNER.—Joseph S. Ford, Philadelphia, Pa.

I claim the combination of the key, a, and burner, A, with the cove, b, of the base, B, with vent holes, d d, substantially in the manner described, and for the purpose specified.

69,557.—CARRIAGE WHEEL.—Walter K. Foster, Bangor, Me.

I claim the arrangement of the ends of the felly, substantially as above described, viz., so as to be supported by the ends of the male contracting screws, or by plates of metal, separate from the nuts, and placed between the two, and sustained by such screws.

I also claim the formation of the braces, h, of the nuts, with recesses, i i, in their inner sides, such being as and for the purpose set forth.

I also claim the tire as made with its inner surface concave transversely to fit to a corresponding convexity of the felly, as set forth.

I also claim the formation of the block, E, with the peculiar recess, r, or its equivalent, in combination with the formation of the nuts with counterparts to enter such recess, as set forth.

I also claim the combination of the braces, h h, with the tire, A, the nuts, D D, and the right and left screw thereof arranged substantially in manner and so as to operate as set forth.

68,558.—STEERING APPARATUS.—Wm. H. Foster (assignor to himself and Michael R. Perkins), Portsmouth, N. H.

I claim the arrangement and combination of the two windless pulleys, E F, and their ropes, b b1, and four leading blocks, G, with the single hand-wheel shaft, C, and with the tiller, T, extended in opposite directions from the rudder head, A, the whole being substantially as hereinbefore explained and as represented.

69,559.—CARRIAGE.—J. Gale, M. B. Ames, and F. Blaisdale, Lawrence, Mass.

1st. We claim the lock braces, d d1, in combination with the standards, B B, having projections, C C1, substantially in the manner as and for the purposes set forth.

2d, We claim the connecting rod, P, in combination with the lock braces, d d1, substantially in the manner described and for the purposes set forth.

69,560.—CANT HOOK.—J. W. Gerrish, Bethel, Me.

I claim the combination of the metallic socket, d, the staff, a, hinged projection, e, and pike head, b, with the cant hook, c, when constructed and arranged substantially as described.

69,561.—CUCKOO CLOCK.—Chas. K. Giles, Chicago, Ill.

1st, I claim supporting the cuckoo, or its equivalent, upon a single vertical post, arranged as described, and shown and provided with a cam, f, and cross arm, e, substantially in the manner and for the purposes specified.

2d, In combination with the post, D, and arm, e, I claim the arrangement of the cam, G, and wheel, F, or its equivalent, substantially as and for the purposes specified and shown.

3d, I claim the arrangement of said arm, e e1, and post, D, with the count wheel, substantially as herein set forth.

4th, I claim, in combination with the post, D, provided with a projection, g, the arrangement of a spring, s, operating substantially as shown and described.

69,562.—TRACE BUCKLE.—Wm. B. Hayden, Columbus, Ohio.

1st, I claim the construction of the tongue, C, with the bulge, e1, for the purpose described.

2d, The combination of the bar, d, and the bulge, e1, of the tongue, C, for the purpose described.

3d, Construction of the lever, D, with the bar, k, as and for the purpose described.

4th, The buckle, constructed and operating in the manner herein described.

69,563.—INSTRUMENT FOR WRENCHING BUNGS OUT OF BARRELS.—August Herde, Baltimore, Md

I claim the above instrument, when constructed as described and for the the purpose set forth.

69,564.—AMALGAMATOR.—Frederick G. Hesse, San Francisco, Cal.

1st, I claim separating, as to size, by means of the separating channel, h, wherein the particles are acted upon by the two opposing forces—centrifugal force and resistance of a current of water, said current being produced by a centrifugal head, and made adjustable in the manner and for the purpose substantially as described.

2d, Combining separation with grinding in order to prevent the grinders from acting upon particles already fine enough, substantially in the manner as described.

3d, I claim the revolving amalgamating chamber, A, in combination with the current of water, as described.

4th, I claim the discharge, T, in combination with the filtering chamber, F, and a current of water produced by centrifugal action for the purpose and in the manner substantially as described.

5th, The annular channel, g e, formed behind the grinding surfaces and in combination with the annular disk, a a, forming an annular channel under C, which communicates with g, for the purpose of producing, by centrifugal action, an upward current therein, the strength of which may be regulated by the dimensions of n, for the purpose, substantially as described.

69,565.—SPRING SEAT FOR VEHICLES.—William Hughes, Brandon, Wis.

1st, I claim the combination, substantially as described, of a seat capable of moving freely vertically between its guides, with a series of supporting cylindrical rubber springs, arranged sidewise, within their guides.

2d, The combination, as described, of the rubber cylinders, with the shelves sliding vertically in their guides.

3d, Making the lower tier of springs of larger diameter than the upper, as described, for the purpose set forth.

69,566.—CAS COCK.—C. B. Littlefield (assignor to himself and T. W. Porter), Boston, Mass.

I claim a gas cock, D, and joint, A, so constructed and arranged that when the cock, D, being open, is turned to a stop in one direction, it will shut the gas entirely off, but when turned to a stop in the opposite direction, will nearly but not entirely shut off the gas.

69,567.—WASHING MACHINE.—Seth Lockwood, Holly, Mich.

I claim the body, A, provided with washboard, B, in combination with blocks or beaters, D D, shafts, g g, pitmen, h h, and the double crank rod, E, when the whole are constructed, arranged, and operating as and for the purpose herein set forth.

69,568.—HEATING FURNACE.—M. F. Magliocco, Phila., Pa.

1st, I claim a series of vertical tubes, e, arranged within an air chamber, B, in combination with exterior tubes and casings through which the products of combustion pass from a fire place to a flue, substantially as and for the purpose described.

2d, The combination of a cylinder, A, containing a fireplace casing, C D, and tubes, e e, the whole being constructed and arranged within an air chamber, substantially as and for the purpose set forth.

3d, A plate, q, arranged within the air chamber, B, in respect to the cylinder, A, and openings, u, substantially as and for the purpose set forth.

69,569.—BEEHIVE.—John Matthius, Pemberton, Ohio.

1st, I claim the hive, A A1, and case, C, with their openings, a a1 b b1 and f, arranged as set forth, in combination with the tube, c, substantially as and for the purpose described.

2d, The inclined planes, H H, in combination with the hive, A, and tube, c, substantially as and for the purpose set forth.

69,570.—COUPLING FOR VACUUM CUPS, BREAST PUMPS, ETC.—Morris Mattson, New York city.

1st, I claim the use and application of the elastic collar and cap, A, for coupling or connecting the different parts of vacuum cups, breast pumps, and other instruments, substantially as described.

2d, The arrangement of the rigid plug D, or its equivalent, in combination with such elastic and adjustable coupling, substantially as set forth.

69,571.—RICE OR SEED DRILL TOOTH.—Daniel. E. McSherry, Dayton, Ohio.

1st, I claim the construction of a rice drill tooth of the form substantially as shown and described, and with a transverse ridge, a upon the inside of its back plate.

2d, The construction of the adjustable drag or coverer, D, upon the back of the tooth, substantially as described.

69,572.—CURTAIN FIXTURE.—William T. Mersereau, Newark, N. J.

I claim combining with the knob and pulley the circular plate, spring, and rack, provided with the cup-like projections, for the purposes set forth.

69,573.—MANUFACTURE OF THE CHLORIDE OF ZINC.—James E. Mills, Brooklyn, N. Y.

1st, I claim producing the chloride of zinc directly from such ores as contain either the oxide of zinc, carbonate of zinc, or silicate of zinc, by digesting such ores with muriatic acid, substantially as hereinabove set forth.

2d, Freeing the chloride of zinc from the gelatinous silica which is formed therein, when the said chloride is produced from the silicate of zinc, as above, by evaporating the water and excess of acid therefrom, and redissolving the chloride of zinc, substantially as described.

3d, Separating the iron and manganese from the chloride of zinc, made directly from the ores when they exist in proportions injurious to the product, by drying the digested mass, oxidizing to a high degree the iron and manganese and redissolving and drawing off the chloride of zinc, substantially as and to the effect hereinabove specified.

69,574.—CAR COUPLING.—James Milne, Perthshire, Scotland.

1st, I claim the pivoted cross head, B, shaft, C, plate, D, and hook, E, in duplicate for coupling cars, arranged and combined, substantially as described.

2d, I claim, in combination with the above, the rod, G, projecting horizontally or vertically, as described.

69,575.—IMPLEMENT OR WRENCH.—J. Mott, Danville, Cal.

I claim the above described wrench or implement, constructed and arranged to operate as and for the purposes set forth.

69,576.—FEED-WATER HEATER.—John Nicholson, Allegheny City, Pa.

I claim a water heater for steam boilers, when constructed, arranged, and operating substantially in the manner herein described and for the purpose set forth.

69,577.—LATHE CHUCK.—John O. Connor (assignor to himself and E. M. Ketchum), Buffalo, N. Y.

I claim a bolt-centering chuck for lathes constructed, arranged, and operating in the manner and for the purpose, substantially as herein described.

69,578.—PUMP.—Nathan Page, Jr., Danvers, Mass.

I claim the combination and arrangemont of the corrugated covering, E, the barrel, A, one or more openings, e, and the tubular plunger, B, opening into the handle, C, through the tube, B1, all suostantially as described.

69,579.—REEL.—Josiah Foreman Palmer, Auburn, N. Y.

1st, I claim the combination of a reel or swift with the pivoted adjustable plate and clamp or frame for supporting the same so that the said reel or swift may be tilted or adjusted to different angles of inclination with respect to the said clamp or frame, substantially as and for the purposes set forth.

2d, The combination with the slotted clamp or holding frame, of the adjustable plate for supporting the spindle, and the screw and thumb nut for adjusting and holding the said plate in position, substantially in the manner and for the purposes specified.

3d, The combination with the arms of a reel or swift, such as described, of a knob or handle, constructed and arranged as specified, so as to be adjusted and held at any desired point upon the said arms.

69,580.—SHEEP HOUSE.—David Pangle, Belmont, Ohio.

I claim an improved sheep house of any required length, hight, and width constructed and put together with panels, G, figs. 1 and 2, or sections held together by tenants, B, on ends of stringers, A, and pinned with movable pins, C, etc., after the plan and in the manner set forth in the foregoing specifications.

69,581.—BALL ALLEY.—J. D. Patrick, San Francisco, Cal.

I claim the above described arrangement of the targets, D, and oblique backs, C, in combination with the alley, A, and return alley, B, substantially as set forth.

69,582.—OIL CUP.—William P. Patton, and Jacob R. Miller, Harrisburg, Pa.

The peculiar combination and arrangement of the adjustable spindle or plug, 2, with the shank, c, of an oil cup, constructed and operating substantially as described.

69,583.—ANIMAL TRAP.—T. S. Phillips, Cassadaga, N.Y., assignor to himself and M. J. Bellows, Dunkirk, N. Y.

I claim an animal trap having a revolving table, A, provided with catch and bait bars, C, at each end and upon opposite sides thereof, coil spring, F, spring catch, c2, and stop pin, d, constructed and operating substantially as herein described.

69,584.—CONVERTING CIRCULAR INTO RECIPROCATING MOTION.—Thomas Plumleigh and Charles Plumleigh, Dundee, Ill.

We claim the device to convert circular into reciprocating motion, consisting of two wheels, A A, supplied with triangular cogs or cams, B B, and secured to an axle or shaft, c, in such a manner that the cogs of one wheel are directly opposite to the recesses of the other wheel, and the slide, p, shaped to fit the recesses of the cogs, B B, and of the length equal to the space between the projecting points of the cogs of one wheel and the receding points of the cogs of the other wheel, said slide being supported by means of a bolt, G, playing in a slotted box, D, or some other equivalent means, the whole constructed and operating substantially as and in the manner herein described and specified and for the purposes set forth.

69,585.—TELEGRAPH APPARATUS.—C. H. Pond, Oberlin, O.

1st, I claim a hinged or jointed self-adjusting connection for completing, working, or governing the local circuit, constructed substantially in the manner described.

2d, The hinged and self-adjusting leaved spring, o o', for regulating the movement of the armature lever, when arranged substantially as described.

3d, A double local connection by means of a three-leaved spring, o', to be brought into action under the influence of a strong current.

4th, The reacting springs, o, in combination with the armature lever, b, helices, a a', and adjusting screws, e k, substantially as and for the purpose set forth.

5th, The jointed forker, w', spring, 9, connecting screw, h, in combination with the armature and reacting springs, o o', substantially as and for the purpose set forth.

69,586.—BROOM HOLDER.—John G. Powell and Wm. A. Morse, Philadelphia, Pa.

We claim the extended arms, m m, made from one continuous piece of wire coiled or otherwise, bent to produce sufficient spring in combination with the base, B, substantially as shown and described and for the purpose set forth.

69,587.—CLOTHES HOOK.—Silas S. Putnam, Dorchester, Mass.

I claim the bracket, A, with its recess, e, and slot or opening, c, in combination with the hook, C or D, constructed and operating substantially as described.

69,588.—CARRIAGE SPRING.—J. G. Reiff, Farmersville, Pa.

I claim the arrangement and construction of circular or elliptic springs by decreasing the thickness of the leaves or plates, multiplying and increasing their number and making the plates tapering gradually, substantially as and for the purpose set forth, the spring to be made of wood, iron, steel, or any material, and for the purpose set forth in the specification.

69,589.—MACHINE FOR DRESSING RATTAN.—N. H. Richardson, Fitchburg, Mass.

I claim the stop, J, in combination with the head, G, and a series of scrapers, m, operating substantially as described for the purpose set forth.

69,590.—PREPARING PAPER PASTEBOARD AND OTHER MATERIALS TO BE USED AS PACKING FOR STEAM ENGINES.—James Ross, Somerville, assignor to himself and L. Fairbanks, assignors to William Adams, Somerville, Mass.

I claim the composition herein described whether composed of one or more or all of the ingredients named, as and for the purpose specified.

69,591.—HYDRAULIC ENGINE.—L. M. Sabin, St. Louis, Mo.

1st, I claim the combination of vat, A, and pipes, vat, B, and cylinders, C C', piston, E E', rods, D D', lever, M, valves, F F' and K K', and rods, H H', as above named and described and for the purpose set forth.

2d, I claim the combination of cylinder, C C', pistons, E E', bars, D D' and H H', valves, F F' and K K', and lever, M, as above named and described and for the purpose set forth.

69,592.—BRICK MACHINE.—Samuel Shreffler, Joliet, Ill.

I claim the combination of the shaft, b, provided with the radial mixers, with the double inclined spiral plane, e, and friction rollers, ff.

I claim the carriage, g, of the peculiar shape and construction shown in combination with the dogs, i i, and rod, l, with operating lever, m, when arranged and operating substantially as described.

69,593.—STRAW CUTTER.—James D. Smith, Richmond, Ind.

1st, I claim operating the knife, B, by means of the tri-radial grooved disk or cam, C, either with rotary or reciprocating motion, substantially as described.

2d, I claim operating the feed by means of the knife in combination with the lever and pawl, substantially as described and for the purpose specified.

69,594.—MANUFACTURE OF ILLUMINATING GAS.—John W. Smith and Thomas H. Phillips, Washington, D. C.

I claim an improvement in making gas from coal tar with the method above described of determining the quality and quantity of gas at any time of the operation by the use of stop cock, H, as represented and described.

69,595.—PUMP.—Flavius J. Underwood, Rock Island, Ill.

I claim the cylinders, A, top chamber plate, B, and discharge tube, C, in combination with the trap valve, F, substantially in the manner and for the purpose as herein set forth.

69,596.—BURIAL CASE.—James H. Van Houten (assignor to Noah W. King and Albert Caswell), New York City.

1st, I claim a burial case or casket composed of two transverse parts, A B connected together by a screw, substantially in the manner as and for the purpose set forth.

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2d, The side, D, in connection with the case or casket, constructed substantially as described.

3d, The combination of the plugs, e e, with the burial case, A B, and slide, D, the whole made substantially as and for the purpose shown and set forth.

69,597.—MODE OF SECURING THE BARS OF PILES OR FAGOTS.—G. Walters and T. Shaffer, Pheonixville, Pa.

We claim securing the bars comprising the piles or fagots for cruciform and other shaped wrought-iron beams or girders by clamps, in the manner and for the purpose described.

69,598.—CHURN.—Moses Walton, Marlboro, Ohio.

I claim the adjustable beaters, D, head, C, in combination with the hollow shaft, a, sleeve, E, extension arms, J, and clamp, I, substantially as and for the purpose set forth.

69,599.—RAILWAY SWITCH.—Wm. Wharton, Jr., Philadelphia, Pa.

1st, The combination of the permanent rails, A and A', of the main track, the permanent rails, B and B', of the turnout, the switch rails, D and D' (the former being inclined), and the movable guard rail, 1, the whole being arranged and operated substantially as and for the purpose set forth.

2d, The switch rail, D', and guard rail, G, coupled together or forming a part of each other, in combination with the rails, B and B' A and A', and switch rail, D.

3d, The switch rails, D and D', and guard rails, G and I, in combination with the permanet rails, A and A', of the main track and the permanent rails, B and B', of the siding, substantially as and for the purpose set forth.

69,600.—CORN HARVESTER.—Charles W. Williams, Wyandotte, Mich.

I claim the combination of the driving wheels, A A, provided with drums, B B, the belts, C C, pulleys, D D, connecting rods, E E, knives, F F, cross heads, H H, guide rods, I I, oscillating tables, K K, levers, L L and M, rods, N N, caster wheel, W, seat, Z, pole, Y, with the frame, X X, arranged substantially as described for the purpose designed.

69,601.—KNIFE CLEANER.—H. Woodward, London, England.

1st, I claim in a knife cleaner a series of jaws pivoted at or near their lower ends and held together at the top by a suitable spring fastening, substantially as set forth.

2d, The combination with the jaws, A, bolt, b, and spring band, c, of the facings, a a, of leather or other suitable substance, substantially as set forth.

3d, The combination with the jaws, A, of the frame, B, chamber, C, and holes, d d, substantially as set forth.

69,602.—PLUMB LEVEL.—John T. Zimmerman and Henry Baker, Lancaster, Pa.

1st, We claim the regulating plate, G, with its base, h, and slot, i, and binding screw, H, in combination with the index, F, provided with four points, f f f, constructed and operating in the manner specified.

2d, We also claim the arrangement of the united supports, B B', by the cross plates, C, in combination with the clamping screw, E, when constructed in the manner and for the purpose set forth.

69,603.—BLACKING BRUSH.—Robert Adams, Cincinnati, Ohio.

I claim, 1st, The application of the glass ball, E, to the mixing the blacking, as specified.

2d, The mode of applying spring holders, B B, spreading brush, D, in combination with blacking box, C, glass ball, E, and recessed circle, G, in top of polishing brush for reception of blacking box, C, as constructed and operating for purposes set forth.

69,604.—AUTOMATIC WAGON BRAKE.—Stephen Alley and Samuel D. Williamson, Clifty, Ind.

We claim, 1st, The combination of the hind axle, B, braces, C, reach, A, and links, D, arranged to operate substantially in the manner and for the purpose set forth.

2d, In combination with an automatic wagon brake the bed, F, and bar, I, with or without the rollers, G, substantially as and for the purpose set forth.

69,605.—SCISSORS AND BUTTON HOLE CUTTER COMBINED.—J. A. Altheuse, New Harmony, Ind.

I claim a buttonhole cutter, B, attached to a pair of scissors by the same rivet, a, when constructed and operating as herein shown and described.

69,606.—HARVESTER.—James Anthony, Ledyard, N. Y., assignor to Cyrenus Wheeler, Jr., Auburn, N. Y.

I claim, in combination with a frame in two parts and hinged to the main axle as a common center, the two levers, E G, one on each frame and operating conjointly to raise or hold in a raised position the rear frame and cutting apparatus connected to it, substantially as described.

69,607.—MACHINE FOR GRATING VEGETABLES.—Horatio Arthur, Martinsburg, N. Y.

I claim the combination herein described for grating vegetables, using for that purpose the arrangement illustrated and specified.

69,608.—FEEDING RACK FOR CATTLE.—G. W. Balding, Angola, Ind.

I claim the notched interlocking boards crossing the box diagonally and projecting beyond the sides of the same and secured to the upright posts in the corners of the box, in combination with said box, all constructed and arranged as described and shown for the purpose specified.

69,609.—WASH TUB ATTACHMENT.—Oren Baldwin, Keokuk, Iowa.

I claim a washing tub attachment having the center shaft, B, handle, I, cross piece, C, and the beater, F, with its faces, G G', to press the clothing against the board, H, together with the board, K, all arranged as specified.

69,610.—HORSE RAKE.—Levi B. Ball, Dayton, Ohio.

I claim the housing, B, constructed and operating as described in combination with spring, F, tooth, C, plate, D, bolt, E, and nut, G, substantially as and for the purposes set forth.

69,611.—LAND ROLLER.—W. W. Ballard, Davisburg, Mich.

I claim arranging a series of rollers, C C, to the frame, A, by means of the bars, H, constructed as set forth and for the purposes described.

69,612.—ROOFING COMPOUND.—Oscar M. Bartholomew (assignor to himself and W. P. Sherman), Elmira, N. Y.

I claim a composition of matter compounded from the ingredients named and in the manner substantially as and for the purpose set forth.

69,613.—SAWING MACHINES.—Joseph M. Batchelor, Foxcroft, Me.

I claim the arrangement of the horse, N, rod, G, and treadle bar, P, as and for the purpose specified.

69,614.—MODE OF CONSTRUCTING MOLDS FOR CASTING ALUMINUM PLATES FOR ARTIFICIAL TEETH.—James B. Bean (assignor to himself and A. H. Balderston), Baltimore, Md.

1st, I claim the thin metallic impression cup, C, for the purpose specified.

2d, I claim the use of the model made in several pieces, substantially as and for the purpose described.

3d, I claim the process of constructing molds for casting aluminum plates for artificial teeth, substantially as above described.

69,615.—METHOD OF SECURING ARTIFICIAL TEETH TO CAST PLATES.—James B. Bean (assignor to himself and A. H. Balderston), Baltimore, Md.

1st, I claim the dental plate cast of aluminum, or other similar metal, having the recesses, E E, and the channel, e e, behind the teeth when they are in position, substantially as described.

2d, I claim the process above described of forcing melted tin or other metal around the teeth and platinum pins, as and for the purpose specified.

3d, I claim the use of melted tin for the purpose of filling the channel or cavity, e'' e'', and attaching the teeth having platinum pins as for vulcanite work to a metallic plate, as and for the purpose herein shown and described.

69,616.—AUTOMATIC BLOTTER.—Joseph E. Billings, Belmont, Mass., assignor to himself and H. H. Moore, Boston, Mass.

What I claim as my invention and desire to secure by Letters Patent is the combination of the covers, the blotting paper and the spring, or its equivalent, substantially as and for the purpose specified.

69,617.—BED BOTTOM.—Luzerne M. Bolles, Cooperstown, N. Y.

I claim the combination of irons, B, rods, C, key blocks, D, keys, E, hooks, F, links, H, and cross bar, G, or their equivalents, with each other and with the bedstead, A, arranged as described and set forth for the purpose specified.

69,618..—COMPOSITION FOR SATURATING PAPER AND OTHER FABRICS.—A. T. Boon and I. Stafford, Galesburg, Ill.

We claim the application and use of saccharine matter employed, substantially in the manner and for the purpose as herein specified.

69,619.—LATCH LOCK FOR DOORS.—Henry Bosch, Mount Vernon, N. Y.

I claim the spring lever, e, in combination with the double lever, c, pivoted to the latch bolt, a, and provided with the knob, b, for the purpose of locking the said spring latch bolt in either a closed or open position, substantially as described.

69,620.—CHURN.—Courtland Boyer, Marshall, Mich.

I claim a churn dasher with inclined perforated slats, F, operated in connection and combination with a churn, B and B, substantially in the manner and for the uses set forth.

69,621.—GAS LIGHT MULTIPLIER.—John F. Boynton, Syracuse, N. Y., assignor to Henri L. Stuart, New York City.

I claim, 1st, A closed box containing capillary material or its aquivalents, with entrance and exit tubes so as to charge gas with volatile hydrocarbons, substantially as described.

2d, A box with a lid and close joints, so as to form a carbureting chamber for gas, substantially as described.

3d, A close chamber or box with cloth or other capil ary material on rods or supports, substantially as described.

69,622.—INSULATOR FOR TELEGRAPHS.—David Brooks, Philadelphia, Pa.

1st, I claim the combination, substantially as described, of a vessel or tube of blown glass with a telegraphic wire insulator, for the purpose described.

2d, A wire holder, A, and case, B, in combination with a tube or vessel, C, of blown glass, arranged between the holder and case and insulated from both, substantially as and for the purpose specified.

3d, A recess arranged between the case, B, and holder, A, and containing paraffin, for the purpose set forth.

4th, A detachable cylinder, D, arranged in respect to the holder case, B, and vessel, C, and insulated from the same, substantially as and for the purpose set forth.

69,623.—CHURN.—A. H. Brown, Springfield, Vt.

I claim, 1st, The angles in the cylindrical portion of the churn marked a', substantially as described.

2d, The dasher, E, forming an oblique longitudinal section of a cylinder, attached to the arms as shown, and operating substantially as and for the purposes described.

3d, In combination with the dashers, E, I claim the scrapers, b, attached to the arm, D, substantially as shown and described; also the latch, i, and button, k, as and for the purpose set forth.

69,624.—CHURN.—M. M. Brown, Pimento, Ind.

I claim the bar, G, cord, H, balance wheel, E, and shaft, F, in combination with the churn and dashers, as herein set forth for the purpose specified.

69,625.—HAWSE PIPE.—Parker Burnham, Gloucester, Mass.

I claim the adjustable hawse pipe, B, arranged within the bow or side of the vessel, when constructed and operating substantially as and for the purpose set forth.

69,626.—REVERSIBLE RAILWAY TICKET SAFE.—Jotham G. Chase, Springfield, Mass.

I claim, 1st, The arrangement in a railway ticket safe of the slotted cover or lid, a, with the base, A, having the inclined ribbed floor, q, all constructed and operating substantially as herein described and set forth.

2d, The arrangement in the end, H, of the base of said railway ticket safe, of the recess, u, for the purpose and in the manner substantially as herein specified.

3d, A railway ticket safe attached to the arm of a car seat, in such manner as that it shall be reversible as described, and equally accessible upon either end of the arm of the seat, substantially as described and herein set forth.

69,627.—HORSE COLLAR.—Simon G. Cheever and James Forgie, Boston, Mass.

We claim the employment of such shaping piece when applied and confined directly between the covering tube which confines the stuffing and the leather which forms the outer finishing cover.

69,628.—BELT CLASP.—Joseph Chenoweth and John McLain, Anglaize Co., Ohio.

We claim the manner of construction of the clasp as herein described, for the uses set forth.

69,629.—SUSPENDER.—C. H. Cleveland, Selma, Ala.

I claim the suspender or shoulder brace composed of two single straps, C C, each passing from its attaching strap at the one side over the shoulder to the attaching strap on the other side of the body, substantially as herein described.

69,630.—HIDE STRETCHING MACHINE.—John F. Coburn, Newark, N. J.

I claim, 1st, Connecting the frames, A and B, of a hide stretching machine, by means of toggle levers, and operating the latter by ratchet bars, D D', and pinions, f f, substantially as herein shown and described.

2d, The frames, A and B, when arranged as and in combination with the toggle lever, C, ratchet bar, D', obliquely sliding board, E, and lever, h, all made and operating substantially as and for the purpose herein shown and described.

69,631.—RAILWAY WATER ELEVATOR.—Martin S. Collar, Marquette, Wis.

I claim, 1st, The combination and arrangement of the irons, P, springs, R, cross bar, L, bar, M, bent lever, K, connecting bar, J, bent lever, X, and piston rod, E, operating as described, for the purpose specified.

2d, In combination with the above, the conical valve, G, constructed as described, consisting of the leaves, g1, hinged to opposite sides of the seat, g2, in such a manner that the water as it rises through the pipe will force the leaves back against the sides of the tube, said leaves reclosing by their own gravity, substantially as described, for the purpose specified.

69,632.—BED BOTTOM.—H. M. Conklin, Syracuse, N. Y. Antedated Oct. 2, 1867.

I claim the combination of the bed rails, a a, the traversing bar, B, and the fastenings composed of the webbing, D, slat protections, E E, and the buttons, F F, all substantially in the manner described and arranged and for the purposes set forth.

69,633.—MACHINE FOR STRETCHING LEATHER.—J. F. Connolly and W. B. Hughes, Newark, N. J.

We claim, 1st, The arrangement of serrated racks, e, and catches, f, or their equivalents, in combination with the stretching beam, B, substantially as and for the purpose set forth.

2d, The arrangement of hinges, c, in combination with the end pieces, a a, of the stretching frame, A, substantially as and for the purpose described.

3d, Making the stretching frames detachable from the power mechanism, substantially as and for the purpose described.

4th, The arrangement of racks, D, and pinions, F, in combination with the stretching beam, B, constructed and operating substantially as and for the purpose set forth.

69,634.—SMUT MACHINE.—W. W. Conner, Nobleville, Ind.

I claim, 1st, The combination and arrangement of suction blast spout, I, consisting of the horizontal part, d, provided with deflectors, f f', and vertical portions, e e', the discharge spouts, J J', grain receiving and air tube, N, fan case, B, communicating with the vertical spout, e, cylindrical screen, F, within the case, G, communicating at one end by the funnel-shaped passage, H, with the screen, B, and its other end communicating by spout, P, with the vertical spout, e', when all are constructed as described, whereby the grain at one passage through the machine is subjected to the action of three distinct blasts of air, as herein set forth.

2d, The valves, Q R, constructed and applied within the suction blastspout, substantially as and for the purpose set forth.

69,635.—PUMP VALVE.—Jas. E. Cronk, Poughkeepsie, N. Y.

I claim, 1st, The valve, D, in excess of the length of cylinder it covers, in combination with the concave seat in the side of said cylinder, substantially as described and shown.

2d, In arrangement therewith the contraction of the cylinder to permit of the play of the valve, whether provided with the flaring cup or not, all substantially as shown and described.

69,636.—TANNING.—Charles J. Cushing, B. F. Walls, and Wm. A. Wood, Hancock County, Ky.

We claim the vatting and tanning in a cold liquid solution under one operation and in one compound vatting and tanning solution.

69,337.—DEVICE FOR ADVERTISING.—Asahel Davis, Lowell, Mass.

I claim making a case of drawers or pigen holes with a place in the front of each drawer for a card showing the wants of the proprietor, with a drawer or pigeon hole receptacle back for the reception of replies, when constructed substantially as described.

69,638.—APPARATUS FOR OILING PROPELLER CRANKS.—Jesse Davis, New York City.

I claim arranging the feed oil can, d, with a cotton wick running through the pipe, e, to a sponge or mop in its lower end, in combination with a perforated receiving box, b, and connecting pipe, c, substantially as and for the purpose herein described.

69,639.—CANAL LOCK.—Horace H. Day, New York City.

1st, I claim a canal lock constructed and operating in the manner substantially as and for the purposes herein described.

2d, I claim in a canal lock constructed as above, the pipes or channels placed in or at the sides of the lock chamber and used for filling and emptying the same, substantially as and for the purposes herein described.

3d, I claim series of valve openings at certain different hights, in combination with said pipes or channels, for the purpose of letting the water into and out of the canal lock successively at said different hights, as herein specified.

4th, I claim in combination with the said canal lock, the construction and arrangement of the vertical main gate or gates, to be operated by hydrostatic power, and constructed substantially as described.

69,640.—GATE.—S. M. Denniston, Hudson, Wis.

1st, I claim the hinge, C, the pivoting pin of which is formed with a spiral or auger-shaped thread upon it, fitting into the spiral thread cut in the eye of the hinge, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the plates, H, levers, G, and bar, F, or their equivalents, with the platform, A, and downwardly projecting pivoting pin of the lever hinges, E, of the gate, B, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the plate, L, lever, K, or their equivalents, and lifting pins, J, with the platforms, and pivoted hooks, I, substantially as herein shown and described and for the purpose set forth.

69,641.—CARRIAGE DOORS.—P. Devilliard and A. Postweiler, Paris, France.

We claim the application to the doors of landaus and carriages similar thereto, of a jointed frame work connected to the door by means of bolts, as herein described and illustrated by the accompanying drawings.

69,642.—TRANSPLANTER.—C. R. Disbrow, Bath, N. Y.

I claim a taper-formed transplanter with a sliding side, a', arranged substantially as and for the purpose herein described.

69,643.—PLOW.—J. G. Dodge, Louisville, Ky.

1st, I claim the frame constructed as shown and described.

2d, The share, P, having the flange, T, arranged to fit in the recess at the front of the frame and form a section of the landside, as set forth.

3d, The plate, N, arranged to fit in the space under the bar, f, and in connection therewith form the rear portion of the landside, as shown and described.

4th, I claim forming the landside of a plow of stationary section, b, and the removable sections, T and N, when constructed and arranged as described.

5th, I claim securing the plate, N, to the frame by means of the notch, w, and the flange, a, as set forth.

6th, Securing the flange, T, in place by means of the point, o, fitting into the notch, o', on the front edge of the section, b, substantially as described.

69,644.—DIE PLATE.—James D. Driggs (assignor to himself and Edward Merrill), New Bedford, Mass.

I claim the frame, B, and cylinder, C, with set screw, D, applied to a die plate, substantially as and for the purpose herein specified.

69,645.—PADLOCK.—Benjamin, John, Samuel B., and Augustus H. Ebert, Frederick, Md.

We claim the construction of the cylinders, I L and M, with their tumbler, K, pin, F, and turntable, E, when arranged, combined, and operated as herein described and for the purposes set forth.

69,646.—CLAMP FOR ROPES AND WIRES.—John H. Elward, Mendota, Ill.

I claim a double acting clamp for suspending ropes and wires consisting of a bifurcated cam lever, B, having the parts, C E and E', and the intermediate projection, F, arranged to operate substantially as described.

69,647.—TALLYING INSTRUMENT.—Geo. Farmer, Flint, Mich.

I claim a registering or tallying instrument constructed substantially as herein shown and described, that is to say, with the two disk wheels, C and D, the levers, f and G, the cams, F and i, and the spring pawls, a, in combination with the dial plate, A', the whole instrument constructed, arranged, and operating substantially as herein described, for the purposes set forth.

69,648.—ANNUNCIATING FIRE ALARM.—Amedee and Eugene Fontaine, Fort Wagne, Ind.

1st, We claim combination of the expansive wire, i, the weighted lever, D, the fan, A, the segmental wheel, B, the stop lever, C, the segmental wheel, k, pinion, j, and hand, l, each of which are constructed and operated for the purpose and in the manner specified.

2d, The combination of the segmental wheel, B, and train operated thereby, and pinion driver, b, for the purpose of so setting thermometrically the apparatus, substantially in the manner and for the purpose described.

3d, The segmental wheel, B, constructed in the manner specified, in combination with the stop lever, for the purpose of maintaining the same relative position of the upper end of said stop lever to the fan, A, the same being operated substantially as set forth.

4th, The stop lever, C, the fan, A, and the helical spring, a, and train, in combination with the bell pull or slotted bar or rack, m, the same being constructed in the manner and for the purposes specified.

5th, The combination of the alarm with the annunciator, the same being constructed in the manner and for the purposes substantially as specified.

6th, The ratchet, G, pawl, s, lugs, o, stop levers, p, the projection, u, on pawl, s, the same being constructed, combined, and operated in the manner and for the purposes specified.

7th, The arm, v, on pawl, s, and fan, w, for the purpose of locking and releiving the train, the whole being constructed and combined in the man substantially as specified.

69,649.—SKATE.—John Forbes, New York City.

1st, I claim forming the drops, a and f, on the toe and heel plates respectively, by punching and bending, so that they are part of the said plates, as set forth.

2d, The manner of securing the heel and toe plates to the posts on the runner, by means of slot-headed buttons, c and g, fitting into T-shaped slots in the said posts, as described.

69,650.—MACHINE FOR WASHING SAND, ETC.—David L. Furnier, Rostraver, Pa.

1st, I claim the method as herein described of crushing and washing sand or rock by means of revolving wheels operated by cross or horizontal shaft beneath the pan.

2d, The construction of iron boxes or elevators, that receive the sand and water mixed in the manner as and for the purpose described.

3d, The scraper that enters each and every box, in the manner and for the purpose described.

69,651.—HORSE HAY FORK.—C. H. Gifford, Philadelphia, N.Y. (assignor to himself and Elbridge Sims), Antwerp, N. Y.

I claim an improved hay fork formed by the combination of the prongs, C, prong shaft, B, rigid arm, E, catch bar, D, pivoted to arm, E, Spring, F, and frame, A, with each other substantially in the manner herein shown and described.

69,652.—HAY LOADER.—C. H. Gifford, Philadelphia, N.Y. (assignor to himself and Elbridge Sims), Antwerp, N. Y.

1st, I claim the adjustable friction pulley, E, arranged in journals in the arms, C', and adapted to bear against the periphery of the wheel, A, as and for the purpose specified.

2d, The combination of the crane, H, rope, G, pulley, F', operating lever, E, and beam, D, with each other and with the frame of the wagon substantially as herein shown and described and for the purpose set forth.

3d, The combination of the rake, I J, with the frame of the wagon and with the hoisting apparatus substantially as herein shown and described and for the purpose set forth.

69,653.—CHURN.—E. L. Gilman, Somerville, Mass.

1st, I claim the dashers, G G, constructed as described and used with the shaft, F, in the manner and for the purposes set forth.

2d, The cups, H H', perforated as described and used upon the lid, A', with the dasher shaft, F, in the manner specified.

3d, The arrangement of the frame, B, upon the lid with wheels, C C C1 C2, pitmen, E E, with their dashers and shafts operated by the wheel, D, in the manner and for the purposes described.

69,654.—PORTABLE FENCE.—N. J. Glover, Waveland, Ind.

I claim a portable zig-zag fence with the panels separated and supported by the wedges, V V, and braces, N N, as constructed and shown.

69,655.—MACHINE FOR PULVERIZING ROCKS, ORES, ETC.—W. F. Goodwin, East New York, N. Y. and Chas. R. Squire New York City.

I claim the series of ribbed or cogged wheels, B2 B3 B4 B5 B6, enclosed within the drum, B, which wheels mesh together and with the teeth or ribs on the inner surface of the hoop of the drum the revolving of which revolves the pinion wheels constructed and arranged to operate in the manner and for the purpose substantially as described.

69,656.—MACHINE FOR CRUSHING ROCKS, ORES, ETC.—W. F. Goodwin, East New York. N. Y. and Chas. R. Squire, New York City.

1st, I claim the long bars, A and A', placed end to end in a horizontal line with each other in the frame, F, and having their outer ends pivoted in the bolts, B, one on each end of the frame, F, and having their inner ends operated independently of each other by means of the cams C C', and pitmen, P P', arranged to operate in the manner and for the purpose substantially as shown and described.

2d, The blocks, K, and K', and spring, I, arranged to operate together in the manner and for the purpose substantially as described.

69,657.—BALING PRESS.—T. D. Guthrie Jr., Galva, Ill.

I claim the combination of the follower, H, screw, I, gear wheels, J K P, shafts, L R, clutches, M O, and S U, gear wheels, N T, and segment, X, having external and internal teeth and provided with sockets, V, for the reception of the levers, Z, with each other and with the frame of the press substantially as herein shown and described and for the purpose set forth.

69,658.—SLIVER CAN FOR COTTON, ETC.—Wm. Hamer, Littl Lever, near Bolton, England.

I claim the spiral spring, c, supporting the movable metal plate, b, in the can, a, having the perforated bottom all constructed and operating as described for the purpose specified.

69,659.—OBSTETRICAL BANDAGE.—J. O. Hamiltcn, Jerseyville, Ohio.

I claim an obstetrical supporter formed in three parts, B C D, and provided with elastic bands, G, extension pieces, K, loops, H, gores, L, and slits, I, all constructed and arranged as shown and described.

69,660.—CHIMNEY CAP.—James Hammond, Adams Center, N. Y.

I claim the chimney cap constructed as described of one piece of cast metal hollowed out upon its under side, B, and having the legs, C, and with its ends and sides, B, flared outward as herein shown and described.

69,661.—WATER CLOSET.—J. B. Hanniniann Detroit, Mich.

I claim the arrangement and combination with the lever, j, of the seat, c, and sliding bar, m, substantially as described.

69,662.—UNIVERSAL COUPLING.—Chas. Haskins, Penn Yan, N. Y.

I claim the channels, a, in the arms, B, and ledge, C, between the arms as and for the purpose herein set forth.

2d, The cross, D, when provided with pivots as described and used to connect the two parts of universal coupling substantially as specified.

69,663.—TREATING STRAW, WOOD, AND OTHER MATERIALS FOR THE MANUFACTURE OF PAPER.—A. M. Hastings, Rochester, N. Y., and Stoughton Pettebone, Niagara Falls, N. Y.

We claim the treating of straw, wood or other fibrous material for the manufacture of paper pulp by boiling the same in a solution of caustic alkali liquor of suitable strength in a closed cylinder or vessel at low temperature not in any case to exceed 300° Fah., accompanied with internal agitation of the contents of the vessel or cylinder produced by wings, brackets, or any other means or mechanical appliances and preferably by the use of a rotating cylinder furnished with wings or brackets as above described.

66,664.—METAL TIP FOR SUSPENDING BROOMS, ETC.—M. C. Hawkins, (assignor to himself and Alonzo Perry), Edenboro, Pa.

I claim the metallic tip for brooms and mop handles constructed as described consisting of the struck up or cast spherical end, L, having the upper edge of the opening, F, nearly in its center and presenting a smooth surface to the hand of the user as herein shown and described.

69,665.—EGG CUP.—Clifton Hellen, Washington, D. C.

I claim an egg cup formed of the sides, A A, consisting of the bowl for holding the egg and the base or feet, B B, on which the cup stands in combination with the hinge, C, and spring, D, as herein set forth and described.

69,666.—SEWING MACHINE.—C. Hodgkins, Malboro, N. H.

I claim the rod, S, fitted transversely and horizontally in the upper part of the needle arbor, E, secured therein by the pressure pin, o, and provided with holes, r, for the thread, s, to pass through substantially as and for the purpose specified.

69,667.—HORSE RAKES.—Frank Holden, Litchfield, Ill.

1st, I claim the sliding rods, L L, connected with the shaft, I, operated through the medium of the foot lever, J, in combination with the hooks, n n on the straps, m m, in which the rake-head, l, is fitted, arms, E E, and pendants, h h, substantially as and for the purpose specified.

2d, In combination with the above I claim the arms, E E, supporting the rake and pivoted to the oblique pendants, h h, substantially as described for the purpose specified.

69,668.—WASHING MACHINE.—S. R. Holmes, Salem, Oregon.

I claim 1st, The rollers, D, and roller frames, B and C, placed in a vertical position and vibrating at the same time in opposite directions in combination with each other and with the box, A, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the double crank, G, and pitmen, I and J, with the vertical roller frames, B and C, and with the box, A, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the lever K, connecting bar, L, crank shaft, M, and slotted plates, f', with each other and with the box, A, and sliding frame, F, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the roller frame, C, and sliding frame, F, with each other substantially as herein shown and described for the purpose of giving to said roller frame a longitudinal and lateral movement at the same time.

69,669.—BUCKLE.—A. H. Hopkins, Goshen, Ind.

I claim a harness buckle formed with two tongues, b b, hung in the middle in opposite directions to lift and catch on the opposite flat sides of the frame against the cross-bars, d d, and provided with tuck-loops, c c, on each side substantially as and for the purposes herein described,

69,670.—LAMP HEATER FOR DENTAL PURPOSES.—J.C. House, Lowville, N. Y. Antedated, Sept. 25, 1867.

I claim the construction and use of the cylindro-conical dome, D E, in combination with the winged cup, d, the perforated diaphragm plate, e, or their equivalents as set forth in the above specification.

69,671.—SEWING MACHINE FOR WORKING BUTTONHOLES.—Edmund Howard and W. H. Jackson, Flushing, N. Y.

We claim, 1st, The combination of the hook lever or needle, K, and split lever or needle, Y, or their respective equivalents, both acting the one after the other to carry the thread from the shuttle or other under thread carrier of a sewing machine to the upper side of the cloth being sewed and around its edge when such levers are arranged to operate together and with reference to the ordinary sewing mechanism of the machine, substantially as described and for the purpose specified.

2d, Operating the hook and split levers, K and Y, or their respective equivalents, with reference to the ordinary sewing mechanism of a machine by and through the forward and backward movement of the shuttle or other under thread carrier of the machine, substantially as and for the purpose described.

69,672.—AMALGAMATOR.—W. W. Hubbell, Philadelphia, Pa.

1st, I claim the series of revolving angular-faced bars, e, operating as described over the cells, a, or bed of quicksilver upon the saturated ore to force it down and longitudinally successively into contact with the quicksilver for the purpose of enabling it to take up the gold and silver in the ore and form an amalgam thereby extracting these metals from their ores.

2d, The construction and arrangement of the feed wheel, h, and water way, r, to operate together and with the said angular-faced revolving bars to regularly supply them with and saturate the ore for amalgamation, in the before mentioned manner.

3d, The construction and application in connection with and behind the bars, e, and amalgamating bed, a, of a waste basin or basins, or amalgam reservoir, b d, adapted to receive and save the quicksilver, gold and silver, or amalgam, as it is sometimes driven back in and with the ore by the action of the bars before settling, as described.

4th, The construction, arrangement and gearing of the revolving pulleys, or their equivalents, to revolve all the bars together by connections or shafts extending through the side piece, w, and with the feed wheel, substantially as described.

5th, The construction of the side pieces, v and w, with the ends of the bars

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and their revolving appliances so that the bars may be readily removed to collect the amalgam and be again restored to their place and work without disturbing the revolving appliances, substantially in the manner and for this especial purpose as described.

69,673.—HAND LOOM.—Henry D. Hunt, Danville, Ill.

1st, I claim the segmental levers, H, pivoted to the lay, C, in combination with the long curved levers, e, the hook, m, the spring, d, the cords, g, and the drivers, I, constructed, arranged and operating substantially as and for the purposes herein described.

2d, The adjustable pawl, p, and screw, p2, connected with the lathe and in combination with the ratchet wheel, p1, on the cloth beam, D, arranged and operating as and for the purpose specified.

69,674.—BRUSH CLAMP.—Arthur Huston, Bristol, Me.

I claim an improved brush clamp, A, formed in two parts, a1 and a2, and in substantially the form and manner herein shown and described and for the purpose set forth.

69,675.—BATHING APPARATUS.—James Ingram, N. Y. City.

1st, I claim the syringe, k, fitted with a piston to receive movable weights and provided with supply pipes and discharge cock, as and for the purpose set forth.

2d, The arrangement of pipes and cocks specified in combination with the bath tub, as and for the purposes set forth.

69,676.—TRUSS PAD.—W. J. Johnson, New Orleans, La.

I claim the truss constructed as described with the thumb pad, B, hinged to the rim of the annular pad, A, the latter pressing against the body in one direction while the former by the action of the spring, F, in the recess, C, presses against the hernia with a lifting action, as herein shown and described.

69,677.—MACHINE FOR COMPRESSING PEAT.—John Jones, Baltimore, Md.

I claim the application of pitted, grooved or corrugated rollers, for the purpose specified.

I also claim the direct application of heat to the pressing apparatus.

69,678.—SELF-ACTING PLOW HANDLE.—John L. Keasor, Laconia, N. H.

1st, I claim attaching one or more plows to the side of a wagon, substantially as herein shown and described

2d, The combination of the horizontal bar, C, vertical bar, E, horizontal beam, F, and brace bar, H, with each other and with the plow, B, and wagon, A, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the pivoted bar, I, chain, K, or its equivalent, and lever, L, with each other and with the plow, B, and wagon, A, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the lever plow cleaner, N, with the plow, B, and wagon, A, substantially as herein shown and described and for the purpose set forth.

69,679.—HARVESTER.—J. M. and M. L. Kellar, Buckeye, Iowa.

1st, We claim the circular cutter, I, and finger plate, H, arranged in connection with a grain platform, E, and attached to the main platform, A, substantially as shown and described to admit of being raised or lowered or turned up to a vertical position, as set forth.

2d, The horizontal revolving rake arm, S, with rake, T, attached and arranged and applied as shown to admit of being rotated from the hub of wheel, K, and raised and lowered either simultaneously with or independently of the grain platform and cutting apparatus, substantially as shown and described.

3d, The lever, R, and lever frame, P, attached respectively to the standard, J, and lips, j j, and arranged and combined as shown for raising and lowering the cutting apparatus.

4th, The placing of the rake arm, S, on the standard, J, and connecting it with the hub, s, of the wheel, K, and with the rod, U, and bell crank, y, as shown to admit of the rake being rendered operative and inoperative at any time when desired.

69,680.—FENCE POST.—J. E. and A H. Kendeigh, Amherst, Ohio.

I claim the herein-described post when constructed of sheet iron provided with flanges, B, and ears, E, in combination with the boards, F, in the manner substantially as set forth.

69,681.—SCYTHE FASTENING.—S. U. King, Windsor, Vt.

I claim the combination and arrangement of the adjustable bearer, D, and its two series of adjusting teeth with the metallic head, A, and the clamp, C, applied thereto, as specified.

I also claim the bearer, D as made in two parts, r s, arranged in manner and for the purpose specified.

I also claim the combination and arrangement of the teeth, m p, and the adjustable arm, E, and the head, A, substantially as described.

I also claim the application of the adjustable arm, E, to the plate, b, by means of the journal extended from the arm and by the bearing for such journal made in the plate as specified the same serving to relieve the screw, q, from lateral strain of the scythe tang such as would tend to loosen the screw in the snath.

69,682.—DITCHING MACHINE.—A. La Tourrette, Waterloo, N. Y.

1st, I claim the combination in a ditching machine of the endless chain, d f, curved spades or scoops, e, bars, K K, drums, J L, propelling shaft and rope, F O, gearing, G H, sweep shaft, I, chain, D E, and the parts, M N a, or their equivalents, for regulating the penetration of the spades, all arranged and operating substantially in the manner herein set forth.

2d, In a ditching machine constructed and operating as herein described, I claim the extensible chains, D E D E, applied to the front axle, in the manner and for the purpose set forth.

69,683.—BRICK MACHINE.—A. La Tourrette, Waterloo, N. Y., and Seth H. Smith, Venice, N. Y.

We claim the reciprocating mold bed, G, when operated from the vertical shaft, C, of the mud mill by means of the revolving curved arm, F, and when so arranged that the molds, b b, are filled at one revolution of the shaft, C, as herein shown and described.

69,684.—SUGAR EVAPORATOR.—Louis Lefevevre, M. D., New Orleans, La.

I claim the construction of the multiple evaporators and triple cylinders, one or more kettles communicating with each other, as herein described and for the purpose of evaporating juice or liquid by direct fire or steam, as set forth.

69,685.—LATHE.—B. M. Leury, Montgomery, Ala.

I claim the combination of the arbor, A, wheels, F G, and pawl wheel, I, grooved pulley, L, and pinion wheel, J, arranged substantially as and for the purpose described.

69,686.—CARRIAGE TRUCK.—Albert Marshall, Methuen, Mass.

I claim a carriage truck or bed, constructed substantially as described for the purpose set forth.

I also claim, in combination with the above, connecting the rear axle to the perch, L, and spring, K, by means of the plates, i k n p, and bolts, b m, constructed and arranged substantially as described.

69,687.—GOVERNOR.—Eli L. McNett, Canton, Pa.

1st, I claim the bars, C, upon the spindle, A, connected to the balls, E, by the rods, b, said balls connected to the short bar, D, on the spindle, A, at an angle of about 45° with the bar, C, by means of the rods, a, which are connected to the sliding sleeve, B, by the rods, d, all operating as described, whereby the momentum of the balls aids the centrifugal force to shut off the steam and the inertia of the balls aids the centrifugal force to let on the steam, as herein shown and described.

2d, The combination and arrangement of the cross bars, C D, rods, a b d, balls, E, and sliding sleeve, B, as herein set forth for the purpose specified.

69,688.—PASSENGER REGISTER.—John Melling, Rochester, N. Y.

1st, I claim the arrangement of the deflecting plate and hollow sill, A, in combination with the lever, F, substantially in the manner and for the purposes herein described.

2d, In combination with the deflecting plate, C, and lever, F, the worm gearing and register hand and dial, all arranged and operating in the manner shown and described and for the purpose set forth.

69,689.—CUTTING TOOL.—M. J. Mellyn, Roxbury, Mass.

I claim the bar, A, constructed substantially as shown and described with the anvil, C, and socket, E, in combination with the chisel, B, substantially as and for the purposes herein set forth and described.

69,690.—BUTTER CUTTER.—A. N. Merritt, Gardner, Mass.

I claim the combination of the inverted cylindrical cup, A, movable plate, F, or its equivalent center pin, C, and cutting wire, D, with each other substantially as herein shown and described and for the purpose set forth.

69,691.—SCOOP FOR SCALES.—Fred. Meyer, Newark, N. J.

I claim as an article of manufacture a scoop for scales, made of one piece of metal, as and for the purpose specified.

69,692.—SLED BRAKE.—T. S. Minuiss, Meadville, Pa. Antedated Sept. 26, 1867.

I claim the scraper, B, armed as described and operated by the lever, C, as and for the purpose set forth,

69,693.—CAR COUPLING.—Freeman Moore, and J. A. Baker, Carrollton, Ohio.

1st, We claim the latch, D, in combination with the forked lever, E E1 E2, the same being arranged so as to automatically couple the link or shackle, G, substantially in the manner set forth.

2d, The combination with the above of the lever, I, bar, I' and arm, J, the same being arranged as described and employed to uncouple and disconnect the cars in the event of running off the track, substantially as set forth.

3d, The combination of the latch, D, link, F, forked lever, F F1 F2, and spring, H, all arranged and operating in the manner and for the purpose specified.

4th, The combination with the coupling and uncoupling devices herein described, of the lever, L, arranged and employed in the manner and for the purpose set forth.

69,694.—MOP WRINGER.—Duane Peck, Rochelle, Ill.

I claim the roller, C, sliding in the groove, b, of the inclined bars, a, the toggle, C c, rod, D, treadle, F, spring, F, sliding roller, G, bearing against the springs, d, all combined and arranged to operate as herein described for the purpose specified.

69,695.—ANIMAL TRAP.—Saml. Pence, Eaton, Ohio.

I claim the construction and arrangement of the levers, J K, one end of each being pivoted to the partitions in the chamber, L, and the other ends to the slides, H L, and pivoted to each other in the center, the bent lever, M, secured at one end to the bar, K, and passing through the block, N, in partition, C, secured to the tiling platform, O, in the center chamber, the spring, R, and lever catch, S, as herein described for the purpose set forth.

69,696.—LINE HOLDER.—Daniel Peters, and Robert F. Williams, Keokuk, Ohio.

1st, We claim the lever, B, with a cross head, d, and a crotch, c, substantially as and for the purpose described.

2d, The bracket, A, with its lugs, e e, substantially in the manner and for the purpose described.

3d, The arrangement of the lever, B, so that the line may be passed between its cross head and the plate, and also through the crotch, c, substantially in the manner described.

4th, The manner substantially as described of constructing the bracket plate, A, with a socket bearing, a and the lever, B, with a pivot, b b, so that these parts may be connected together without any auxiliary device, such as a rivet or detached pin, as set forth.

69,697.—CULTIVATOR COUPLING.—Joshua Pierport (assignor to himself and Sidney S. Tuttle), La Harpe, Ill.

1st, I claim the turn-table clevis, with the head, g, in combination with the axle arm, a, both constructed and operating substantially as and for the purpose herein described.

2d, The combination of the clevis, and the axle arm, a, with the connecting bar, E, arranged and operating as and for the purpose described.

69,698.—ROCKER FOR CRADLE.—Patrick Power, Chicago, Ill.

I claim the combination of one or more rollers, C, with the rocker, B, substantially as herein shown and described, and for the purpose set forth.

69,699.—MOTIVE POWER FOR LOCOMOTION AND OTHER PURPOSES.—D. A. Pratt, Fremont, N. Y.

1st, I claim the mode and manner of adding the power of one coiled ribbon or main spring, or in lieu thereof a "coiled spiral wire spring," to another, by gear or its equivalent, in such a manner that the power of each and all of them shall reach one or more common centers or "units of power," substantially as described.

2d, The use of spiral wire springs, in "sets," as well as also a coiled ribbon or main spring, in groups, as herein described, for motive purposes.

3d, The mode and manner of attaching this particular power, as herein set forth, to the driving wheels of the carriage thereof, for the purposes and as described.

4th, The combination of this power, when thus accumulated, with three or more pinions and gear as described, and for the purposes set forth.

69,700.—KEYHOLE GUARD FOR DOOR LOCK.—D. A. Pratt, Sing Sing, N. Y.

I claim the V-shaped cam, or spiral screw, revolving on the arbor, a, of the key, for the purposes of expanding or contracting the arm, b, or lip, c, also the serrated arm, b, as well as the combination of said serrated arm, b, and lip, c, with said cam.

69,701.—STUMP EXTRACTOR.—G. W. Pressey, Hammonton, N. J.

I claim the pawls, H H, constructed in annular form, so as to fit loosely on the lifting bar, B, and provided with pendent arms, f, in connection with the levers, E E, all arranged and applied to operate in the manner substantially as and for the purpose set forth.

I also claim the holding and retaining pawl, I, when used in combination with the pawls, H H, and the levers, E E, substantially as and for the purpose specified.

I further claim the pin, e, fitted on the lifting bar, B, in combination with the lower perforated bent end of the lifting bar, all arranged for the purpose of holding the chain to the lower end of the lifting bar, substantially as shown and described.

69,702.—BOILER GAGE COCK.—John G. Raymond, Rondout, N. Y.

I claim the disk or button, C, arranged substantially as described, in combination with the tube, A, and aperture, c, as and for the purpose specified.

69,703.—WOODEN PAVEMENT.—Robert L. Ream, N. Y. city.

I claim, in the construction of wooden pavements, the removable and replacable notched keys, for locking in transverse directions, sections made of a series of blocks spiked, grooved, and banded together as herein described, so that the sections may be taken up when pipes or sewers are to be laid in the street, and readily laid down again, or for repairs, as set forth.

69,704.—SELF-ADJUSTING ELASTIC GATE.—Peter S. Reist, Oregon, Pa.

I claim the construction of self-adjusting elastic gate as herein described, and for the purposes set forth.

69,705.—ROTARY STEAM ENGINE.—Rudolph W. Riess, Philadelphia, Pa.

1st, I claim the reversible valve, C, of a rotary engine constructed and arranged substantially as described.

2d, In combination with the above, the lever, K, constructed of hinged parts, substantially as described.

69,706.—HOSE COUPLING.—L. J. Roberts, Corry, Pa.

I claim the hose end, B, constructed with coupling pins, b', and the independent nut, C, constructed with a screw thread, bayonet slots, and one or more springs, D, in combination with each other, and with the hose end, A, substantially as herein shown and described, and for the purpose set forth.

69,707.—CARTRIDGE FOR FIRE-ARMS.—Jacob Rupertus, Philadelphia, Pa.

1st, I claim a projectile, A, having a central opening, a, in combination with a case, C, arranged in front of the projectile for containing the powder, all substantially as set forth.

2d, The combination of the projectile, A, and its central opening, a, with the case, B, its detonate chamber, and indented or grooved projecting, g, the whole being arranged substantially as and for the purpose set forth.

3d, The casing, C, composed of paper or other fabric, and wire net work, and secured to the front of the projectile, all substantially as described.

69,708.—LOOM FOR WEAVING RIBBONS, ETC.—John Rushworth, New York city.

I claim the metal rack, A, constructed of bars, d d, and rods, c c c, as shown and described, combined with the strap, h, and pinions, f f, in the manner and for the purposes set forth.

69,709.—CARD SETTING MACHINE.—James Russell (assignor to himself and H. A. Collins), Springfield, Mass.

I claim the spring, G, formed in the carrier rod, and adjusted by means of the arm, J, and set screw, H, substantially in the manner and for the purpose herein set forth.

69,710.—SEEDING MACHINE.—A. V. Ryder Germano, Ohio.

1st, I claim the bed piece, D, provided with the ears, h h, as and for the purpose described.

2d, The revolving seed box, g, bed piece, D, plated upright or bar, a, beams, A, and E E, and hopper, C, all constructed and combined as and for the purpose described.

69,711.—LOOM.—Levi Scovfield (assignor to himself and Justin B. Wait), Farmington, Wis.

1st, I claim the stop bar, f, when attached to the stepping bar, H, and used to stop the cams, a a1 a2 and a3, alternately, thereby preventing the momentum of the cam shaft from carrying up too far one of the cams that in turn would prevent the descent of the harness, and a full shed of the warp, substantially as described.

2d, The sliding bar, S, when constructed with the arms, b and b', the arm, b1, set out from the face of the bar so as to allow the cam, n, to work against the arm, b, and the cam, h, against the arm, b', and used to operate the treadle, L, substantially as and for the purpose set forth.

3d, The double cams, h and n, when attached to the cam shaft, R, and used to operate the sliding bar, S, and at the same time holding the latter and the treadle in position, while the shuttle is thrown substantially as and for the purpose set forth.

69,712.—HORSE COLLAR.—T. J. Shipley, and W. A. Moody, Montezuma, Iowa.

We claim the hollow pad, B, fitting over and securing the ends of horse collars, said pad having upon its inside the longitudinal rubber springs, C, which springs fit over the ends of the collar, and are secured to the outside of the walls in holes, e, by means of the hooks, d, as herein shown and described.

69,713.—HORSE RAKE.—J. H. Shireman, York, Pa.

1st, I claim a continuously revolving axle, or shaft, B, with ratchets and pawls, or their equivalents, applied to both wheels, substantially as and for the purpose described.

2d, In a horse hay rake I claim placing the ratchets and pawls upon the inner sides of both driving and transporting wheels, substantially as described.

3d, I claim the combination of a driver's seat, G, a pressure contrivance for holding the teeth down to their work, a continously revolving axle which is furnished with a lifting device, and a device connected to the rake head, which, at the will of the operator, can be thrown into gear with the lifting device of the axle, for the purpose of discharging the gathered hay from the rake teeth.

69,714.—SPIRIT METER.—W. Siemens and J. G. Halske, Berlin, Prussia.

1st, I claim the measuring drum constructed and arranged as herein described so as to rotate with a springing motion, that is to say, provided with three compartments so formed that the center of gravity of the spirit during its influx into said compartments shall lie in a vertical plane passing through the axis of the drum, substantially as shown and set forth.

2d, The alcoholometer in combination with its index and supporting spring, substantially as and for the purpose herein shown and specified.

3d, The mechanism herein described for imparting to the counterwork a motion which shall at all times be proportionate to the volume of pure alcohol contained in the spirit or liquid which passes through the measuring apparatus.

4th, The combination with the mixing vessel, N, of the pipes or tubes for the induction of the spirit or liquid arranged as described so that when spirit of varying strength is conducted into said vessel the heavier shall enter above and the lighter below the alcoholometer, substantially as and for the purposes set forth.

5th, The combination with the measuring drum and interior cylinders, K, of the mechanism for obtaining a sample of the spirit proportionate in quantity to the volume of the said spirit which is measured, arranged and operating substantially as set forth.

69,715.—ELECTRICAL TORCH.—John K. Simpson, N. Y. city.

1st, The herein-described electrophorus consisting of the hard rubber tube, c, the metallic plate, F, and the metallic tube, B, connected through the plate, D, and rod, a, with the outer surface of the rubber tube, C, and through the rod, m, and ring, E, or its equivalent, with the outer surface of the handle, A, arranged and operating as set forth.

2d, I claim the perforated cup, N, provided with a suitable nipple, O, and uninsulated wire, w, attached to said nipple, arranged in the manner and for the purpose described.

3d, I claim the combination of an electrophorus situated near the lower end of a torch, the perforated cup, N, at the upper end of said torch, and the insulated conducting wire, J, between the electrophorus and the perforated cup, so arranged as to receive the spark or sparks from the electrophorus and conduct the same opposite to the end of the uninsulated wire, w, situated above the nipple, O, of the perforated cup, N, the whole being arranged and operating in the manner and for the purpose substantially as set forth and described.

69,716.—WAGON HOUND AND POLE BRACE.—Fridolin Smith, Tiffin, Ohio.

I claim the construction of the hound and slider of the two bent strips, A A', secured to the axle bolster and provided with filling pieces, b, and blocks, o, substantially as described.

69,717.—SLEIGH BRAKE.—H. W. Smith, Rainsbury, Pa., and B. C. Smith, Fokeston, Ind.

1st, We claim the combination of the brake irons, F, operating ropes, H, roller, S, or its equivalent, tongue rope, I, and sliding rope, K, with each other and with the tongue and frame of the sled, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the brake irons, F, operating ropes, H, roller, S, or its equivalent, frame, L, and roller, M, with each other and with the box, E, and frame of the sled, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the brake irons, F, operating ropes, H, roller, S, or its equivalent, and roller, P, with each other and with the frame of the sled, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the coiled springs, G, with the brake irons, F, and operating ropes, H, substantially as herein shown and described and for the purpose set forth.

69,718.—CHURN DASHER.—Johnson Smith, Kansas, Ill.

I claim the shaft, B, with eight horizontal arms, B', to which are connected the diagonal slats, C C', in such a manner that their inner ends nearly meet at the center of the shaft, so that the cream may be caught by the slat, C, and carried to and under the slat, C', as and for the purposes specified.

69,719.—MECHANICAL MOVEMENT.—C. D. Snell and J. W. Penney, Mechanic Falls, Me.

1st, We claim the sliding collar, D, in combination with the upright, C, or its equivalent, and in combination with the pitmen, H and K, or their respective equivalents, in manner and for the purposes substantially as described.

2d, The collar, G, sliding in the sliding collar, D, and in combination with it and with the upright, C, or its equivalent, in manner and for the purposes substantially as described.

3d, The sliding collar, G, in combination with the pitmen, E and F, or their respective equivalents, and in combination with the cranks, a and b, in manner and for the purposes substantially as described.

4th, The pitmen, E F H and K, and collars, D and G, in combination with the shafts, A and B, and cranks, a and b, all substantially as above set forth and described.

69,720.—ARMOR FOR HOOFS OF HORSES.—Henry Splitdorf, Brighton, Mass.

I claim the armor, C, for protecting the feet or hoofs of horses or other animals, made substantially as described above, by fastening a series of plates to each other or to a flexible foundation, B.

69,721.—COTTON PRESS.—H. D. Stover and John W. Hutchinson, New York City.

1st, I claim the construction and arrangement of the suspended tube, C, within the frame, A, provided with the plunger, I, attached to the screw rod, H, adjustable cross bar, G, wheel, J, guide rods, E E, as, herein set forth.

2d, Binding the upper part of the staves of the barrel, D, together, by means of the band, M, having parallel projections, b b, upon its ends, and oval links, N, substantially as herein shown and described.

3d, Securing the barrel, D, beneath the tube, C, and plunger, I, by means of the adjustable blocks, K, and keys, L L, constructed and arranged as herein set forth.

69,722.—WAGON BRACE AND FENDER.—James E. Strode (assignor to himself and Thomas H. Strode), Carrollton, Ill.

I claim the plate, A, having shoulders or flanges, B, formed upon or attached to its under side, and jaws, C, formed upon or attached to its outer edge or side, substantially as herein shown and described and for the purpose set forth.

69,723.—METAL ROOFING.—John B. Stryker, Philadelphia, Pa.

I claim a roof composed of transverse sheets, a b c, one side of each of which is passed over and nailed to grooved strips, B, and the other side soldered to the adjacent sheet over the strip and covering the edge of the first sheet, whereby neither the means of fastening nor the seams are exposed, substantially as described.

69,724.—SLEIGH BRAKE.—Frank Teelin and Jacob A. Swift, Blossvale, N. Y.

We claim the direct motion of the tongue, T, upon the levers, S, by means of rods, A A, arranged and applied as represented and described.

69,725.—CULTIVATOR.—S. D. Tuttle and J. H. Gans, Eaton, O.

1st, We claim the sliding or adjustable doubletree, K, applied to the draft pole, G, substantially as shown and described, and connected to the plow beams, E, on the axle, C, all being arranged to operate substantially in the manner as and for the purpose set forth.

2d, The pivoting of the draft pole, G, to the main frame, A, in connection with the pivoted socket, H, and the foot piece, J, all arranged to operate substantially as and for the purpose specified.

3d, The arm or lever, N, provided with the foot piece, O, and the toothed segment bar, P, on the front cross piece of the frame, A, the arm or lever, N, being attached to a plow beam, E, and all arranged substantially as and for the purpose set forth.

4th, The rake, S, connected to the arms, V, fitted on the axle, C, and having the springs, W X, attached to them substantially as shown and described.

5th, The application and arrangement of the rope, Y, as shown and described, for the purpose of raising the rake when required.

6th, The combining of the sliding doubletree, K, plow beams, E, on the axle, C, and the pivoted or laterally adjustable draft pole, G, all arranged to operate in the manner substantially as and for the purpose set forth.

69,726.—WASHING MACHINE.—John Vail, Yankee Jim's, Cal.

I claim, 1st, The combination and arrangement of the sliding box or tub, B, the pounders, D, shafts, E, cams, H, and shaft, I, with each other and with frame, A, substantially in the manner herein shown and described and for the purpose set forth.

2d, The combination of an ordinary wash board, C, and movable side, b' with the tub, B, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the levers, N and O, and block, P, with the sliding tub, B, and with the frame, A, of the machine, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the lever, K, shaft, L, arm, M, and movable frame, G, with the pounder shafts, E, and with the frame, A, of the machine, substantially as herein shown and described and for the purpose set forth.

69,727.—COMBINED CRANK, FRICTION WHEEL, AND BRAKE.—R. M. Van Sickler, New York City.

1st, I claim attaching the crank to the wheel in such a way that it may be turned or moved back so as to bring its handle to, or nearly to, the center of the said wheel, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the crank, F, friction wheel, C, brake strap, D, and brake lever, E, with each other and with the pinion shaft, B, substantially as herein shown and described and for the purpose set forth.

69,728.—SPINNING MACHINE.—Franz Voegtli, Montgomery City, Mo.

1st, I claim the combination and arrangement of the parts, F F1 f f1 f2 f3 f4 and G, substantially as and for the purpose described.

2d, The automatic feeder, H H1 G G1 and g g1, to distribute the threads upon the spool, D, substantially as set forth.

3d, The general combination of all the parts as shown, substantially as and for the purpose set forth.

69,729.—HOT AIR, STEAM, AND WATER GAGE.—James C. Walker, Waco Village, Texas.

1st, I claim the pipes, L M N O, passing through steam boilers as above described, as and for the purpose set forth.

2d, The combination of the boiler, A, the pipes, L M N O, the valves, v v v v, and the reeds or whistles, c c c c, substantially as and for the purpose specified.

69,730.—FAUCET.—Clemens Weaver, Easton, Pa.

I claim the plunger, C, sleeve, B, spring, D, and valve, E, arranged in the faucet, constructed in the manner and for the purpose set forth.

69,731.—CULTIVATOR AND HARROW TOOTH.—R. West and H. F. Paul, Concord, N. H.

1st, We claim extending the flaring parts or the wings of a cultivator or harrow tooth back beyond the rear edge of the body of the tooth, and having the space between the said wings, open on top, to allow the surface soil to fall over the edges of the wings into the furrow made by the tooth, substantially as herein shown and described.

2d, Having the wings, B B, of a cultivator or harrow tooth removable from the body, A, of the tooth, substantially as and for the purpose herein shown and described.

69,732.—HARVESTER.—Cyrenus Wheeler, Jr., Auburn, N. Y.

I claim, in combination with a main frame, in two parts, and having the the axle, or its equivalent, as a common center of motion, a two-armed lever to one of the arms of which it is connected the draft of the machine, while the other transmits the former of the team to the raising up of the rear frame and its connected parts, substantially as and for the purpose set forth.

69,733.—RAILWAY.—T. Whittemore, Cambridgeport, Mass.

I claim the bolt holder as made with its external notches formed substantially as set forth.

I also claim, in connection with the bolt holder, having its external notche formed as described, the arrangement of the outer bolts with screws pitche in opposite directions, as explained.

I also claim the combination and arrangement of the auxiliary bolt heads with the bolt holder rails and lap bars, the whole being as specified

I also claim the combination of the bolt holder, constructed as described, with the bolts, the rails, and the lap bars, as specified.

I also claim the arrangement of the check grove, b, and the lap bar, the bolts and nuts, or the same and the holding plate, applied to the two rails, substantially as set forth.

69,734.—MACHINE FOR MAKING NAILS FOR HORSESHOES.—William Wickersham, Boston, Mass.

1st, I claim, in horse-nails machines, the device of two series of working rolls, one series for the side and one for the edge of the nails, so arranged that each succeeding pair of rolls from the first shall have a greater motion than the preceeding pair, suited to the increasing length of metal as it passes through the machine, and so arranged that where the rolls are formed, as described, a wire of indefinite length, in passing continuously through the machine, will be completely formed into nails, or partially so formed, ready for another similar machine to finish, as described.

2d, The construction of a series of pairs of working rolls in horse-nail machines of cylindric form with grooves or spaces on the outside, having the same form and depth extending from one end to the other of the rolls, and suited for the side or edge of the forming nails, and so arranged in the series that each succeeding pair shall have wider spaces than the preceeding ones, and suited to the increasing length of the forming nails as they pass from the first to the last of the series, substantially as described.

3d, The arrangement of the working roll on the shaft, with washers, which are transferable from one end of the roll to the other, in such manners as that all parts of the roll may be successively used, as described.

4th, I claim the application to the rolls, herein described, of a stream of water, in the manner and for the purpose set forth.

5th, I claim the device herein described for separating the head of the nail from the point of the succeeding nail, in the manner and for the purpose set forth.

69,735.—THIMBLE SKEIN FOR AXLES.—John A. Williams, Elizabeth, Ill.

1st, I claim the elongated skeins, B B, furnished with a socket at the but end thereof, in manner and for the purposes substantially as above set forth and described.

2d, Adjusting the thimble skein beneath the axle by means and manner for the purposes substantially as above set forth and described.

3d, Constructing the thimble skeins, B B, in one piece, with open extremities, b b, through which the wooden axletree passes, in manner and for the purposes substantially as above set forth and described.

4th, The connecting rod, D, furnished with a right and left-hand thread or any equivalent, for the same, and setting into the sockets, C C, or their equivalent, or the thimble skeins, B B, in manner as and for the purposes substantially as described,

5th, Securing the thimble skeins to the axletree by means of the bolster

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bolts, E, working in the slots or mortices, e e, in manner and for the purposes substantially as above set forth and described.

69,736.—HORSE-POWER.—Thos. Wittse, Jr., Panama, N. Y.

The combination of the driving wheel, A, having oblique teeth, a1, formed as described, upon the under side of its rim, the vertical shaft, B, horizontal shaft, E, pinion wheel, F, band pulley, G, band or belts, H, pulley, I, and crank pulley or wheel, J, with each other and frame, C, the sliding pitman box or bridge, L, the frame, C, and crank pitman, K, substantially in the manner herein shown and described and for the purpose set forth.

69,737.—ELECTRIC STEAM GAGE.—E. A. Wood, Utica, N. Y.

1st, I claim the mode, substantially as herein described, of indicating the pressure of the mercury column by means of insulated points in the mercury tube connected with like points on the index.

2d, Combining with an ordinary mercury column a galvanic battery, substantially as described for the uses and purposes mentioned.

3d, The mercury column and index, constructed and operating substantially as described.

69,738.—COMPOSITION FOR CONCRETE PAVEMENTS.—Russell Fisk, New York city.

1st, I claim the mode, substantially as set forth, of corresponding and preparing concrete blocks for paving.

2d, The mode of laying pavements by the use of concrete blocks, imbedded and united, substantially as set forth.

REISSUES.

2,770.—HEEL STIFFNERS.—John Ashton Greene, Brooklyn, N. Y., assignee by mesne assignments of Daniel E. Hayward, assignor to Alfred B. Ely and Charles Wild, trustees. Patented October 27, 1863, Reissued October 8, 1867. Division A.

I claim as a new article of manufacture for the heels of boots and shoes, a stiffening made of india rubber, mixed with ground rags, or other suitable fibrous material, and formed in molds substantially as and for the purpose described.

2,771.—HEEL STIFFNERS.—John Ashton Greene, Brooklyn, N. Y., assignee by mesne assignments of Daniel E. Hayward, assignor to Alfred B. Ely and Charles Wild, trustees. Reissued October 8, 1867. Division B.

I claim as a new article of manufacture a heel stiffener or counter of India rubber, and its compounds, which is shaped and vulcanized in the mold in which it is formed, and made as set forth, for the purpose described.

2,772.—HORSE RAKES.—James D. Jones, Columbiana, Ohio.

Patented May 9, 1865.

Iclaim, 1st, The pivoted seat, g', in combination with the levor, s, and catch, 11, when used for the purpose of holding the rake teeth, l, to their work, as herein described and set forth.

2d, The combination of the unshipping piece, r, pivoted seat, g, and catch, 11, with the lever, s, when used for the purpose of unshipping the slide, I, and for holding the lever, s, and thereby keeping the teeth, l, to their work, substantially as herein described and set forth.

2,773.—REFRIGERATOR.—M. C. Longacre, Cleveland, Ohio.

Patented March 15, 1864.

I claim the combination with the open frame ice-box, A E, the movable rack, O, movable corrugated plate, F, movable rack, g, trough, H, and waste paper, i, with a refrigerator or provision room, for the purpose herein specified.

2,774.—SHINGLE MACHINE.—Charles S. Burt, Dunleith, Ill., assignee of Harriet L. Low, administratrix of H. H. Low. Patented April 19, 1859.

I claim, 1st, In a shingle machine operated by means of a vertically reciprocating frame, E, which feeds a shingle bolt to a circular saw, C, I claim the use of a rack and pinion by which a constant and uniform feed motion is secured while the shingle is being sawed, substantially as described.

2d, In a shingle machine such as is above contemplated, I claim the use of a rack and pinion for feeding uniformly the bolt to the saw, in combination with another rack and pinion, by which the frame, E, is elevated preparatory to making a new cut, substantially in the manner above described.

3d, In a sawing machine of the kind herein set forth, I claim the instrumentalities above described, or their fair equivalents, for securing the automatic working of the machine, substantially as described.

2,775.—SPRING HINGE.—Charles E. Stanley, Cleveland, Ohio, assignee of Doctor Joseph Sherbruene Smith. Patented May 19, 1857 Antedated May 12, 1857.

I claim, 1st, The construction of a hinge with a tubular joint, having a torsion spring therein, and with devices for adjusting and retaining said torsion, substantially as and for the purposes described.

2d, The combination of the center pin, adjusting or screw pin, headed or capped spring, and tubular hinge, constructed and arranged to operate as and for the purpose substantially as described.

NOTE.—FIFTY-FIVE patents in the above list of claims were issued through the Home Office of the Scientific American Patent Agency.—EDS.

PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & Co., *37 Park Row, N. Y.*

56,410.—IMPROVEMENT IN FOLDING CHAIRS.—Benjamin J. Harrison and James Condie, New York City. Dated July 17, 1866. Application for reissue received and filed Sept. 27, 1867.

1st, We claim so constructing and combining the legs, A, and B, with the front and back seat rails that in folding the chair the front seat rail shall pass underneath the back one, substantially as and for the purpose specified.

2d, The attachment of the rear most edge of the flexible seat to the back, E F, below the pivots by which the back is attached to the legs, B, whereby the back is held in position by the weight upon the seat, substantially as and for the purpose specified.

3d, The transverse bar, G, so arranged in relation with the pivoted back seat rail, C, the back, E F, and the legs, B, to serve as a brace to hold the back in position when the chair is opened and as a handle by which the chair may be carried when closed, substantially as herein set forth.

4th, A folding chair composed of the crossed legs, A B, flexible seat, D, back, E F, pivoted back seat rail, C, and transverse bar, G, the whole constructed, combined, and arranged substantially as and for the purpose specified.

51,897.—SPIKE.—International Patent Bolt Machine and Split Spike Company, New York City, assignees by mesne assignments of Lancelot Kirkup, Brooklyn, N. Y. Dated Jan. 2, 1866. Application for reissue received and filed Sept. 24, 1867.

I claim a railroad split spike the prongs of which have inclined edges terminating in flat points, substantially as set forth, and are so constructed that when the spike is driven into the wood the prongs will be bent outward in a plane parallel with the plane of the split in the spike, the whole operating as described.

48,694.—WATER WHEEL.—T. J. Kindleberger, Springfield, Ohio. Dated July 11, 1865. Application for reissue received and filed Sept. 30, 1867.

1st, I claim the springs applied to the opening and closing mechanism of the gates where a plurality of gates are used for a single wheel, so that any one of said gates, in case of being prevented from closing, will not prevent the closing of the others, as herein set forth.

2d, The arrangement of the bent arms, C, and levers, D, with the set screws e, springs, g, plate, E, the pendant pins, h, the segment, G, and pinion, H, for operating the gates, B, as set forth.

3d, The arrangements of the buckets, I, of serpentine form, substantially as herein described and set forth.

4th, The cap, I, through which the shaft, j, of the pinion, H, passes and covers and protects the parts for opening and closing the gates, as herein set forth.

5th, The cap, I, provided with the boxes, k, having following blocks in their recesses, with one or more set screws to each, to adjust them to the shaft, F, substantially as herein described and set forth.

62,084.—WASH BOILER.—M. W. Staples, Catskill, N. Y. Dated Feb. 12, 1867.

I claim forcing by pressure of steam a circulation or current of water or suds through the clothes in the process of washing or cleansing them, as applied to a washing boiler, substantially as herein described, or by any equivalent device.

19,321.—PLOW.—George Watt, Richmond, Va. Dated Feb. 9, 1858. Additional improvement dated Aug. 2, 1859. Application for reissue received and filed Sept. 27, 1867.

1st, I claim the combination in a plow of a landside having an inward inclination from its base toward the mold board, and a neck, breast, or standard having a diverse or outward inclination, substantially as set forth.

2d, I claim constructing mold board and land side of cylindrical surfaces intersecting along the cutting edge of the plow, in combination with the curved standard, S, the whole being constructed substantially as and for the purposes herinbefore set forth.

3d, I claim the combination of the eccentric roller, r, beam, B, notches, i, and cuff, f, substantially as set forth.

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of 30 days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application to MUNN & CO., Solicitors of Patents, 37 Park Row, N. Y.*

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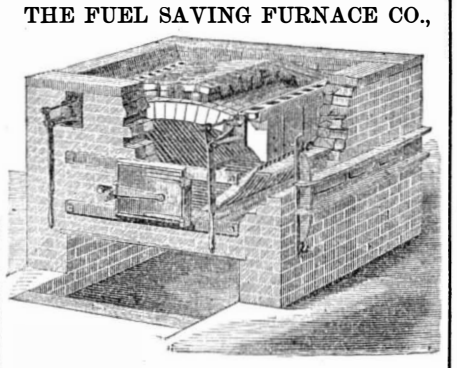

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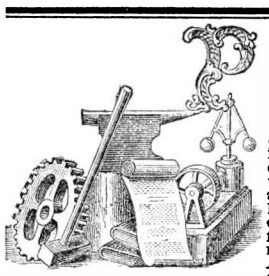

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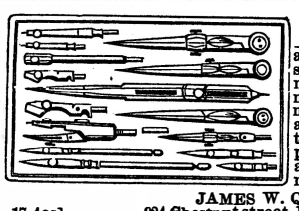

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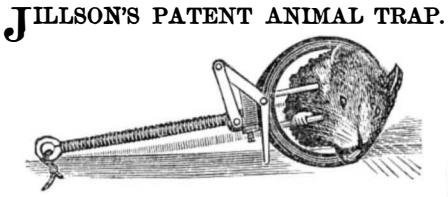

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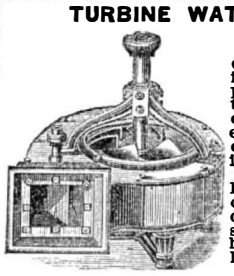

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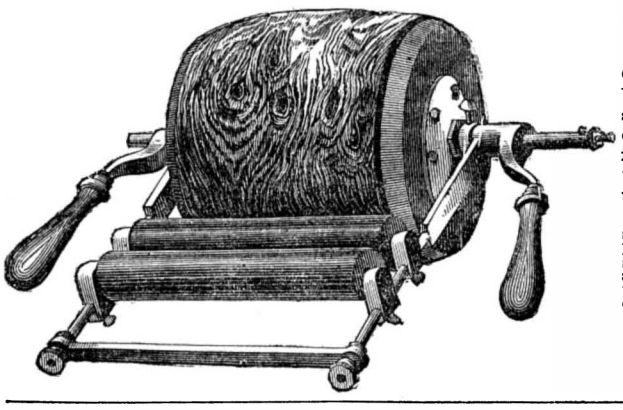

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